COAL AGE

Vol. 2 NEW YORK, AUGUST 17, 1912 No. 7

"SAFETY first" is the popular slogan of mine managers these days, but—

Suppose you were the superintendent of a coking operation that furnished all of the fuel for a large blast furnace plant (perhaps this furnace plant did not have a stock pile of coke to fall back on), and suppose that on two or three occasions you had trouble with your ovens and mines and failed to produce enough coke to keep the furnace running, and on each of these occasions when you attempted to explain the reason for the shortage, the manager "took a fit," so to speak and handed you something that sounded like "D—— your excuses! How do you expect me to keep a furnace running on excuses?" Do you think you would discuss "safety first" with that manager any time soon?

At a certain mine where all of the coal is shot down with black powder (at this particular plant the company commissary is the only store where powder can be purchased),a rule is in force prohibiting any miner from having more than one can of powder in his working place at any one time.

Before the advent of the "safety first" manager, the men were allowed to ride the man trip in the morning with or without their keg of powder. Sometimes it happened that the man trip hauled 60 or 70 kegs of powder, accompanied by men, boys, picks, shovels, pipes, etc. The new manager decided that if two kegs of powder in one working place were dangerous, perhaps 60 kegs going at the rate of 10 miles per hour on trips that had been known to wreck once in a while, should be classed as risky also, and so an order went out compelling all men who had powder to carry to the working places to walk.

Now we arrive at the "but———"

The commissary manager found out one morning at 6.30 that his magazine was empty. A carload would surely arrive by 10.30, but miners are not anxious to waste time under such conditions. The superintendent realized that the men must go to work as usual or some of his ovens would be banked the following day. This excited him unduly, since he had been the cause of a furnace shut-down the week before.

He pleaded with the men, but to no effect. Happy thought—he promised to send the powder to each man needing any as soon as it arrived that morning. That satisfied the miners, and they went to work. The superintendent took a long breath and went down to his office to steady his nerves.

This left it up to the commissary manager. He carried out his part of the responsibliity by having the powder hauled to the mine mouth as soon as it arrived. The trip rider next came into action. He loaded all of the powder into two mine cars and gave the signal to go ahead. At the inside gathering track he unloaded it promptly ten minutes later. It was then up to the drivers, and the latter looked at it suspiciously at intervals of fifteen minutes, or thereabouts, as they came out with new loads. After the lapse of an hour or so, the mine foreman came along and ordered them to distribute it according to his directions.

No explosion occured that day.

The output was normal.

The furnace was not fed on excuses

But—

Moral: Don't say "D———, Mr. Manager."

[Editor's Note.—This foreword was written for "Coal Age" by Henry S. Geismer, manager, Southern Iron and Steel Co., Chattanooga, Tenn.]

Ideas and Suggestions

Interesting Talks Submitted in Response to Our Recent Request for Forewords.

A large number of valuable articles were sent to us by readers in reply to our invitation for forewords. The manuscripts received are so varied in character, and some of the subjects treated are so unusual, that any attempt to select and grade them according to merit can only result in a personal choice based largely on the individual tastes and experience of the editor.

We wish it understood, therefore, that the publication of proposed forewords in this department of our paper does not mean that the subject matter presented has been found wanting in practical usefulness, but rather that the interest and loyalty of our readers has been such, that to print only one article each week would necessitate our returning many excellent manuscripts.

Our request for forewords is still open, and we earnestly invite all who have any message for coal people, or practical suggestions relative to mining, to send their thoughts to us in the form of a written article. If there is any apparent value to the result submitted the matter will be published in some part of our paper. Remember—every line we accept and print is paid for.

Producing Clean Coke

By Pennsylvania Fireboss

In these strenuous times of coal digging, when each official finds it necessary to keep in touch with his mining neighbor so as to enable him to keep step in the line of progress, he makes it his business to inquire of all parties who approach him seeking employment: Where did you come from? What are they doing there? How are they getting along?

The object appears plain that each party is eager to become the possessor of any new idea, practical wrinkle, or cheap method of performing some particular work. Continued inquiry of this kind brings forth information concerning any new device which has proved a success. Then like the "Rat hole in the corn crib" they all find it worth looking into, and that plant at which the contrivance is in use becomes a Mecca for the pilgrimage of all skeptics.

The possessor of the new idea, proud of his achievement, explains everything in detail, and each observer returns to his home plant with an increased volume of knowledge, capable of performing one more charitable act for his employer.

COAL AGE has somewhat eliminated this necessity by throwing open its pages for the rank and file, which is principally made up of men whose early education has been quite neglected, and not only enables them to progress with their neighbors, but to know what their more remote brethren are doing.

On a recent visit to a neighboring mine in search of increased knowledge, I was afforded the pleasure of an interview with an able and successful superintendent. In our conversation, he interrogated me on many things pertaining to the plant at which I was employed. In return he made a number of suggestions, one of which was the following: *In order to make clean coke, we should not have more than* 55 *per cent. of the output coming from pillars.*

Also, contrary to theory, he advised having *a short breaking line on a pillar section;* the idea being that although a long working front might produce a better line of fracture in the overlying strata, it would be more productive of fine crushed slate, which latter is difficult to remove by hand methods.

I accordingly transferred my acquired information to our mine superintendent, who experimented with it, and who was most agreeably surprised at the results obtained. He shortened, or rather cut his long gob lines into sections, ceased the unnecessary driving of rooms, and drove sufficient entry to keep up his output.

The result was that the overlying weight did not appear to concentrate on any one spot, the pillars were kept moving uniformly on their ends, there was a steadier pace in extracting pillars, and less fine dirt was found in the coke.

I admit this result cannot be entirely accomplished at all mines, for conditions are variable, but the above suggestions may be an incentive to new ideas along this line, help solve similar troubles and perhaps reduce mortality in mines.

The Electrical Haul

By Ohio Engineer

When you lay out and develop a mine, one of the matters to be borne in mind is the haulage. On the excellence and efficiency with which you plan and execute the means to that end, the profitable operation of your mine is likely to depend.

When you open up shaft, drift or slope, try to locate it in the center of your field if its configuration, the railroad facilities and the trend of the contours of your coal permit. If for some temporary reason a noncentral position is taken, try to arrange that when later you can move your tipple to the hub of your field, the coal can be brought advantageously to the new center by roads designed to that end.

In most of the mines the country over, the need of haulage is last considered. Looking at the map you would think that the mine was at an end and the owner or superintendent did not have a coal field beyond. The most elementary sense of fitness would have suggested providing better roads thither than those traced out on the map.

One may wager that if you saw such a circuitous road on your railroad or automobile chart you would want to know if you needed to take such a roundabout route. If the country roads around the mines took such devious turns the woods and fields would be full of the bypaths made by your miners.

The lack of method by which the workings are planned, together with the in-

adequate supervision which accompanies it, give winding, rolling roads on which operation at moderate speeds is dangerous and at high speeds is practically impossible, and, of course, the haulage is not any more efficient than it is safe.

The haulage entries should be driven wide enough that a locomotive with an outside frame can be used. When the frame is bunched between the rails and the locomotive weighs 10 tons or more, the small space left for the motor cramps the installation and may even in extreme cases necessitate the use of three motors where two should do the work.

Next in importance to a straight, unobstructed haul is the weight of rail used and the efficiency of the bonding. On all haulageways over which trips of 40 cars or more are hauled, the rail should weigh at least 40 lb. to the yard and much better results would be obtained were this weight increased to 50 or 60 lb. per yard.

When the heavy rail is used, the first cost is of course greater, but the maintenance of the haulage system is correspondingly decreased, with an increased capacity. For the same conditions the heavier the rail, the larger the trips which can be hauled, because with increased contact between wheel tread and rail the locomotive obtains a tighter grip and increased tractive power. Consequently the wear on the wheel treads is more equally distributed, the life of the wheels and rails greatly prolonged, and the wear and tear on the locomotive and on the mine cars much reduced.

The complaint is often heard that "we can't get any voltage," and some person wiser than the rest goes into the working face after the day's work and tests the line with a voltmeter and finds no unreasonable drop. This "wise acre," however, fails to remember that the cutting machines and locomotives are not running and that consequently the only current flowing at the time of the test is that through the voltmeter.

The same test made in the midst of a busy day, will not show results which appear so satisfactory. If an investigation of the cause of low voltage is made, it will be found, in almost every case, that the bonding is either a negligible quantity or very poor.

Fishplate bonding, bonding with iron wire or even copper wire, etc., does not provide a good return circuit. Manufactured stud bonds should be used and they should be installed with the assistance of a bond compressor and then examined frequently after they are placed. A good bond tester should be a part of the equipment of every electrical mine and it should be used constantly.

Stranded or solid copper wire should be used for bonding. The former seems to be more suitable, for when coal or rock fall on it or when the locomotive leaves the track it is not as apt to be completely broken or sheared off at the head of the stud. The rails should be cross-bonded every 350 or 400 ft.

Good bonding insures maximum efficiency of the electrical part of the haulage system and considerably lessens the chance of burning out armatures on account of the fact that under normal trip conditions the locomotives are operating at their normal power rating and therefore the current in the armature of the motor does not become so great as to cause trouble.

With proper regulation of the voltage on the haulage circuit, the tonnage of a mine can be kept at its maximum with the cost of production per ton, reduced to a minimum, from an electrical standpoint.

Work and Wages

By Colorado Superintendent

Labor is a commodity measurable in units of work performed, which units have a definite value in money to anyone who employs labor. The establishment of a system which will permit the definite recording of each unit of labor performed by every workman in a coal mine seems impractical to most operators; so the ancient custom of a certain wage for a certain time, irrespective of units of work performed, is still in vogue to the constant discontent of the workmen and to the actual loss of the operator.

To prove the last assertion, let us take a concrete example. Two timbermen working together at a daily wage of three dollars each, put up four sets of timbers, while two other men in another part of the mine, or these same men on another day, put up six sets in the same time for the same wage.

The simple statement of the above variation in output, which variation is not a function of the difficulty in performance but the outcome of deliberate forbearance from labor on the part of the workmen and which occurs in almost every coal mine repeatedly, is sufficient to prove to the most obtuse of us that the timberman will soon find out the minimum work that the pit boss will stand for, and do that much and no more.

Discontent is the reward of the workman who does more than the minimum and loss is the price of the system to the operator. Those of you in whose mines timbermen are paid by the contract system have only to size up your motormen, drivers or tracklayers instead of timbermen, and you can apply the example equally to your mine.

It would seem then that the inauguration of a system for measuring and recording units of work, accompanied by a fair standard price for each unit, would do away with all discontent and loss. Such a result may be possible, and indeed scientific management, of which we hear so much, was conceived in the thought expressed at the beginning of this article. Content in a workman demands something more than payment of mere money for his labor. It demands confidence.

By confidence we do not mean a feeling on the part of his superiors that the workman will do his work quickly and well when not directly watched; we mean rather the imparting to him a knowledge of just what his work means in the production of coal.

A superintendent keeps track of every department of his mine in a large measure, by a study of his cost sheets, and the writer knows from actual experience that the most ignorant workman can appreciate dollars and cents when applied to his work.

Confide in your timbermen what was the cost per ton of timbering in your mine last month and ask them to help you reduce the cost for the next four weeks. Tell your motor men what was the cost of gathering coal last month, calling attention to repairs, supplies, etc. Then show one motor man what was the cost of running his motor and compare it with the cost of running another in the same mine.

Let your machine men know that you have noted how much coal each one cuts in tons and linear feet; show them the records in your possession, and let them realize that you know how much time and materials the repair department has charged to each one. Show your drivers just how much a few more cars per day will reduce the cost of coal in cents per ton.

Confide in your men a thousand and one things which will suggest themselves to you, and the result will be beyond your fondest hopes. A new interest will awaken in your work and in that of your men; with a friendly spirit of rivalry, the men will want their department to make the best showing.

When this show of confidence has produced results in cost saving, do not take to yourself all the glory and emolument. Establish a reward system, not in an increase in the daily wage of your men, but rather a compensation based on the saving effected by any man or set of men over your present costs.

Spotless Coke Towns

By Mining Engineer

Years ago when a company started a new mining town, large sums of money were invested in uptodate mining equipment, but the dwellings were about the last things considered, and what money was left over after equipping the mine, and it was little enough, was used in constructing the mining village. As the laborers were reasonably content with primitive conditions as long as everyone lived a simple life, operators did not improve until recently on the crude backwoods system of laying out towns.

The polyglot inhabitants of such villages are gradually demanding a recognition of their need for better living conditions and are asking for better houses. Also the operators are finding that to get the pick out of the laboring class, they must have something that other neighboring operators do not have, and they are starting to lay out and improve their towns, and they are making them as nearly sanitary as possible.

Last year the H. C. Frick Coke Co. spent something like $450,000 on their coke towns and most of these villages you will find cleaner and in a better sanitary condition than those surrounding them. They have water in a large per cent. of the houses and along all the village streets, concrete gutters to carry off the waste and surface water.

At 80 per cent. of the houses you will find gardens, and in many places flowers. At many of the works plots of grass are carefully fenced. Many of the works have playgrounds set aside for the children to play in, these recreation grounds being equipped with swings, horizontal bars and other gymnastic equipment suited for children.

Privy vaults are constructed of concrete, and in the alleys receptacles of sheet iron or concrete are erected and each family stores in them their ashes and refuse, which daily, or every other day are removed in wagons. Cow stables are kept away from the houses and are in many of the towns grouped together. Each family which desires to keep a cow is given one of these sheds. In many villages there is a man employed to see that the concrete gutters, etc., are kept clean.

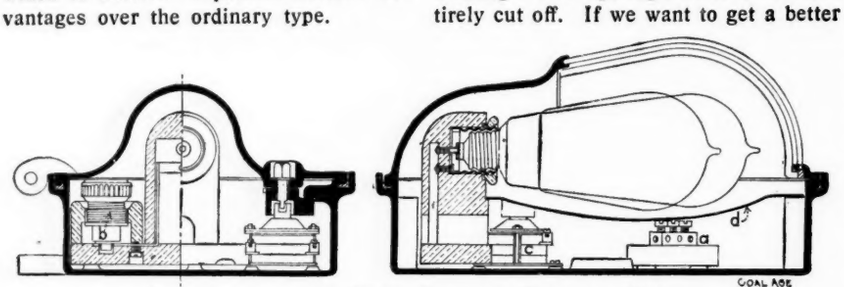
While some people think that anything is good enough for the foreign element which goes to make up a coke town, yet it is believed that these workmen will appreciate what the corporation has done for them and that the company will benefit by getting good laborers. So it is a help to both parties, and it is hoped that the lead taken by the H. C. Frick Coke Co. will be followed in time by all the operators.

A Horizontal, Gas Proof, Electric Bulb

As a result of experiments made at the testing station in Gelsenkirchen, Germany, in 1909, at which numerous switch and safety devices for electric lamps were subjected to trial in firedamp, the firm of Schanzenbach & Co., of Frankfurt-on-Main, Germany, has brought forward an incandescent-lamp fixture which is claimed to present various advantages over the ordinary type.

In the so called pendant fixtures which are commonly used for lighting crossings, loading stations, machine rooms, etc., the utilization of the lighting power is restricted by the vertical arrangement of the incandescent lamp, which throws the illumination concentrically downward. They are used advantageously only where the height at which they are hung is not too greatly limited; for example, in machine rooms and loading stations. If, however, only a slight elevation be possible, as, for instance, at crossings, then in order to get a better side illumination when using the pendant fixture, and further to avoid obstructing pony haulage or other movements, the fixtures must be arranged in niches in the roof. This is unfavorable to the illumination.

The so called marine fixtures, by which the lamps are held horizontally, have the advantage of less projection but the disadvantage of sacrificing light, as the incandescent bulb is set in a cast-iron housing. Side lighting is thus almost entirely cut off. If we want to get a better light with these fixtures, we have to use more lamps.



LONGITUDINAL AND CROSS SECTIONS THROUGH HOLDER

This difficulty is avoided by using the "Gluckauf" incandescent-lamp fixture. The accompanying illustrations show its arrangement when in a recumbent position. Inside of the casing are two or three branch terminals *a*, for service with direct or three-phase alternating current. Right and left of the insulated lamp socket are the gas-proof fuses *b*, of the Diazed system. The gas-proof bipolar pocket switch *c*, which is placed directly beside one of the fuses, has a safety catch, which permits opening of the fixture only when the switch is turned off. The lamp bulbs and switches are therefore replaceable only when the lamp has no current.

The cover which goes over the whole fixture is so arranged that it can be unhooked and a new guard globe inserted underground; reserve covers may be kept on hand so that there need be no delay in replacing them. As the lamp projects out of the fixture and is surrounded only by the protective globe with a wire guard, this permits the light to fall on all sides. To increase the lighting power, there is provided a reflector *d*, which, at the same time covers all bare terminals. The cable terminals, connected with the fixture, are equipped with the usual fastenings.

According to the principles of safety in firedamp, the armatures, except for high candle-power and multiple-light lamps, are constructed with tube and cable connections.

Note—Translated for Coal Age from an article by Herr Brunnenbusch, Engineer, of Essen, Germany, in "Glückauf."

Our Front Cover this Week

The underground view published on the front cover of COAL AGE this week, shows a new Ingersoll coal puncher at work in the Wittbank collieries in the Transvaal, South Africa. It is particularly interesting to note that the negro who is shown operating the puncher works barefooted and scantily clad. Another interesting point is the style of shovel held by the man standing near the center of the picture. No better indication of the wide market catered to by the manufacturers of American mining machinery could be given.

Standard Fireproof Mine Stables

By E. L. Cole

Concrete stables are replacing wooden structures underground. Concurrently the veterinarian is making his influence felt. In a modern stable, there is no place where the water from a hose and where the scrub broom cannot penetrate. The resulting cleanliness prolongs the life of the mule and adds to its efficiency.

It is a sad commentary on human nature that a catastrophe is needed to call attention to and enforce the need of making use of every means to safeguard life and property. The disaster at the Cherry mine impressed on many mine managers that the construction of inflammable buildings was a poor economic policy to pursue underground.

The loss by fire of all the mules in a stable brought home clearly to one of our coal companies the lesson indicated. But the well built stable has other advantages, for the mule spends 15 hr. within its confining walls and his condition is much improved if it is well ventilated and otherwise sanitary.

Need for More Sanitary Stables

The drawings accompanying this article have been adopted as standard by one bituminous and two anthracite coal-mining companies. The designer has tried to meet the requirements of the mine inspector, mine manager and veterinary surgeon. The stable is of fireproof material throughout except the top floor of the stalls, which for the comfort of the mules is made of plank.

Fig. 1 is a ground plan of the stable. It is designed on the unit plan, so that the drawing is available for a stable to contain one or any number of mules. Ample room is provided in front and behind the stalls. It will be noticed that a good concrete floor is first laid, in which are imbedded the tracks for the feed cars. Facing and also at the back of the stalls are concrete gutters for carrying out the water daily used to cleanse the stable.

Each stall is 8 ft. 4 in. long and 5 ft. wide, and so is commodious enough for the largest of mine mules. The concrete piers for the center posts are clearly shown in the drawing.

Fig. 2 is a cross-section of the stable. The thickness of the concrete floor, position of drain pipe, slight pitch of the plank floor, car tracks, passage ways, gutters, manger, feed box, center posts, end arches, and the 2-in. gas pipe which alone forms the partition between the stalls, are all clearly outlined in the drawing.

The single gas pipe is an improvement over the old style high board partition, as it offers no resistance to the free circulation of air, and the building is always free from obnoxious odors. When it is necessary to stable a fractious mule, he is usually placed in one of the end stalls, and the gas-pipe partition is reinforced by a strap-iron lattice-work, which effectually prevents him from annoying his neighbors.

Fig. 3 is a detail drawing showing side view and plan of the center post. This exemplifies a method of supporting a stable roof which is both effective and inexpensive, and in the eight stables where it has been tried, no failures have been recorded. It may here be noted that the end arches extend throughout the entire length of the stable, serving the double purpose of sealing any coal measures and supporting the mine roof.

Fig. 4 gives the construction details in a longitudinal section through the center posts. The method of supporting the T-rail laggings, and the position of the mangers are clearly shown. Fig. 5 is a plan of the arches with the T-rails in position.

Provisions for Cleaning and Lighting

Fig. 6 supplies all needed details of construction of the manger with its feed box, which have been designed with a view to sanitation as a leading desideratum. They are usually constructed in the shops and sent to the mines with all parts marked as lettered in these drawings. The work of installing them is thus simplified, and can be done by the average mine timberman. Particular atten-

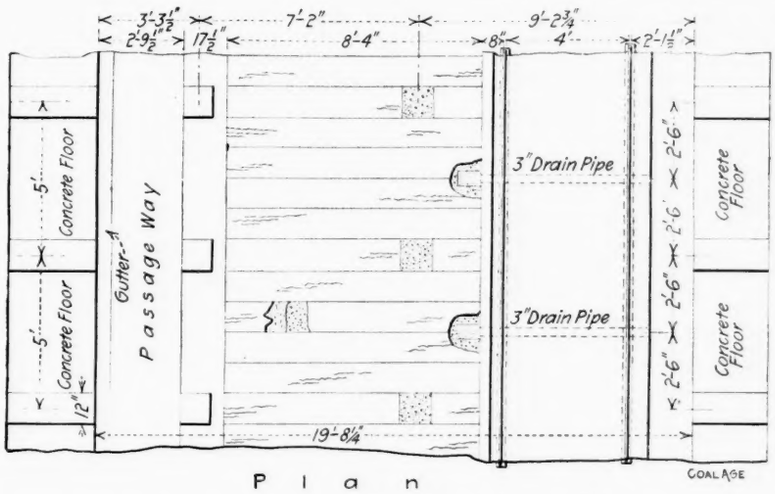


Fig. 1. Two Stalls of Subterranean Concrete Mule Stable

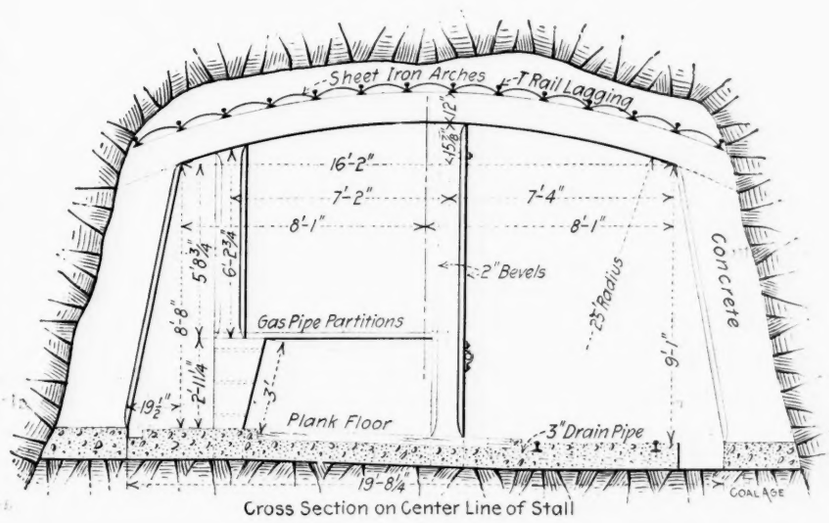


Fig. 2. Detailed Elevation, Showing Manger and Drainage System

tion is called to the hole provided in the bottom, affording a convenience for cleaning same.

When the construction of the building is completed, the sheet iron which forms the temporary support for the concrete arches, is not withdrawn, but is left in position and when whitewashed serves as an efficient reflector for the electric lights which are provided in each stall.

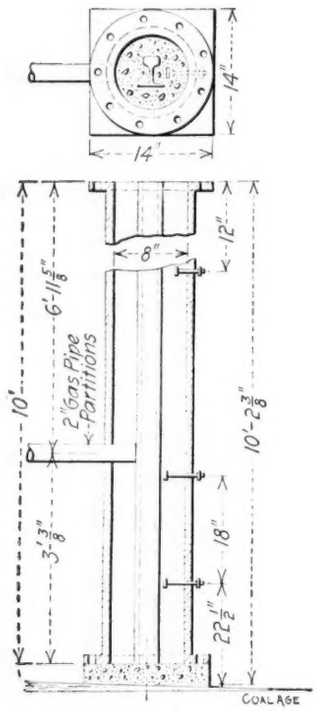


FIG. 3. CAST-IRON CENTER POST

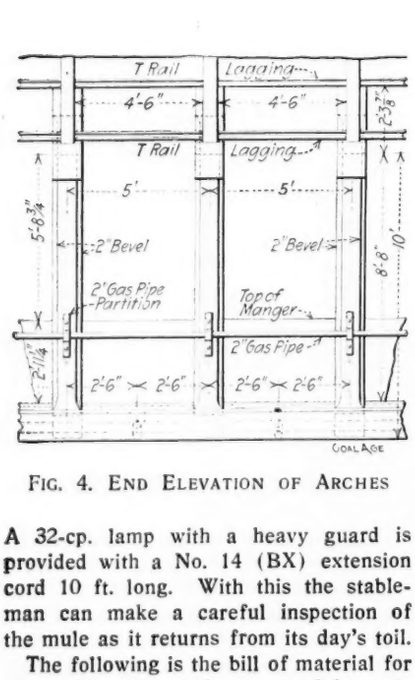


FIG. 4. END ELEVATION OF ARCHES

A 32-cp. lamp with a heavy guard is provided with a No. 14 (BX) extension cord 10 ft. long. With this the stableman can make a careful inspection of the mule as it returns from its day's toil.

The following is the bill of material for one stall only, and an equal increase should be made for each additional mule for which accommodation is required.

BILL OF MATERIAL FOR ONE STALL

40 bags of cement. 5 tons of sand.
14—T-rail laggings—4 ft. 6 in. long (40 lb. rail).
70 ft.—odd lengths old T-rail (for reinforcing).
1—10 ft. length, 8 in. dia, Cast-iron Column pipe.
13 pieces of sheet iron—4 ft. 6 in. long x 1 ft. 6 in. wide (for arches).
2 pieces of No. 8 sheet iron 5 ft. long x 3 ft. wide.
1 piece of No. 10 sheet iron 2 ft. x 2 ft. for feed box.
5 floor planks 8 ft. 4 in. long x 1 ft. x 4 in. thick.

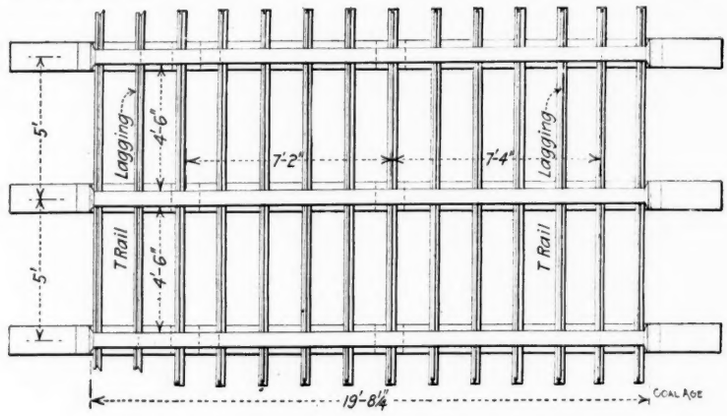


FIG. 5. PLAN OF ARCHES, SHOWING T-RAIL REINFORCING

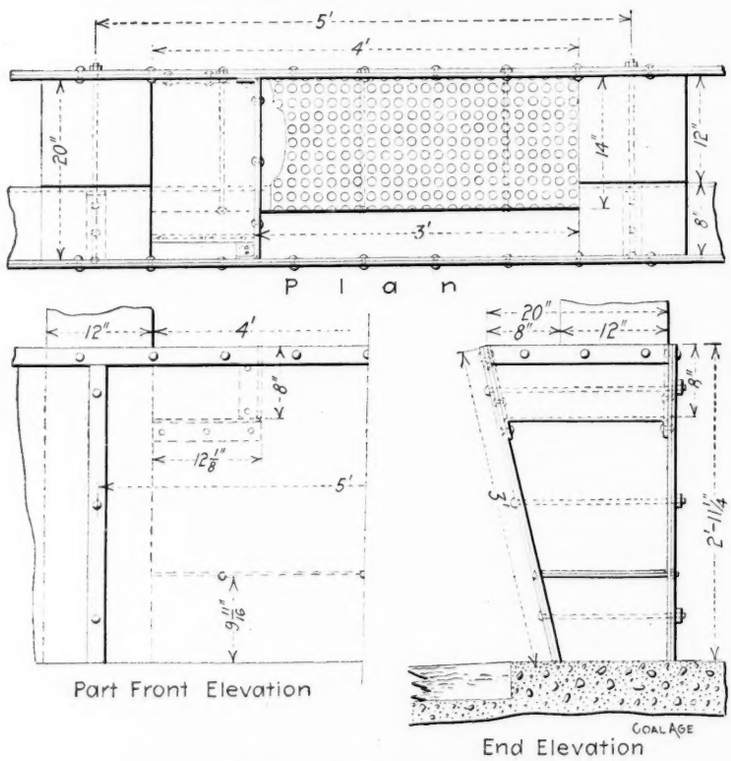


FIG. 6. DETAIL OF MANGER AND FEED BOX

1 bolt—1 ft. 8 5/16 in. long x ⅝ in. diam.
1 bolt—1 ft. 5 5/16 in. x ⅝ in. diam.
1 bolt—1 ft. 2 5/16 in. long x ⅝ in. diam.
3 bolts—1 ft. 3½ in. long x ⅝ in. diam.
3 bolts—4 in. long x ⅝ in. diam.
2 bolts—3 in. long x ⅝ in. diam.
28 rivets 1 in. x ½ in. diam.
1 piece 2 in. diam. gas pipe, 7 ft. 8 in. long (for partition between stalls).
1 piece 3 in. diam. gas pipe, 5 ft. 9½ in. long (for drain).
2 iron straps 2 ft. 10 in. long x 2 in. wide x ¼ in. thick.
2 iron straps 2 ft. 9½ in. long x 2 in. wide x ¼ in. thick.
10 lin. ft. of strap iron 2 in. wide x ¼ in. thick.
1 piece 1-in. mesh segment for tray 4 ft. long x 1 ft. 2 in. wide.
2 brackets.

The reader will note that no provision has been made for a watering trough at each stall. There is a difference of opinion among veterinary surgeons as to the desirability of the practice of placing water within reach of the animals at all times.

PROVISIONS FOR WATER AND HARNESS

The gravest objection is the habit acquired by some mules of drinking copious draughts of water after eating, thus washing the food into the intestines before it is acted upon by the gastric juices. However, those who care to have water available at all times, can readily do so by installing a small cast-iron basin in each stall and a pipe line running the length of the stable, with taps at each feed box.

The design does not provide for cupboards or closets of any description, as at best they are unsanitary, and only serve as a place of concealment for property of the mule drivers. There is provided in the rear of each stall a number

of hooks, arranged to hold the harness so that the part which is required first is lowest, and the last piece needed is on the highest hook. Each part is numbered to correspond with the hook and the harnessing of mine mules in these stables is marked by an absence of excited drivers, bewailing in loud voices the loss of a part of their harness, and as each piece bears a brand to indicate the mule to which it belongs, it is not easy for a driver to confiscate another's gear.

For the stableman there is provided a row of hooks for repaired harness, a second row for repair parts, and a third row for broken harness, so that, at no time, is there any occasion for any litter on the floor. There is further provided, two heavy plate-glass shelves for such articles as are necessary for first aid to injured mules. The entire stable presents a sanitary and pleasing condition and compares favorably with the most modern above ground.

Did the Bignall Hill Mine Explode

By James Ashworth*

The explosion in the Bignall Hill colliery (Jamage shaft) was quite mild and failed to explode the dust of the roadways. The writer thinks that a blast of heated afterdamp from the gob fire was expelled by a roof fall, and calls attention to the fact that gas may sometimes burn on a red hot porous surface without flame. He believes that the Talk o' the Hill colliery (England) and the Wellington mine (New South Wales) also "exploded" in the same manner.

*Consulting Mining Engineer, 930 Drake St., Vancouver, B. C.

Within the last few weeks the British Home Office has issued the report of its Chief Inspector of Mines, R. A. S. Redmayne, on a disaster termed an explosion, which occurred at the Bignall Hill colliery, North Staffordshire, Nov. 25, 1911. At the time of this disaster the colliery staff and a few miners were engaged in erecting stoppings to keep out the air and so isolate a gob fire.

The coal varied in thickness from 6 ft. up to 22, and the part of the mine which was threatening to break out into a fire was in a pillar where the coal was 22 ft. 9 in. thick. This bed, known as the Bullhurst, was noted for spontaneous combustion, and the stratum of the seam which gave the greatest trouble in this respect was at the bottom.

The Mine Fire Was Anticipated

The management found it necessary to be constantly on the *qui vive* and prepared for any emergency. Consequently three of the roadways leading into the district were already closed by thick dirt packs faced with brickwork, and three other stoppings were partially constructed, and only space enough for the cars and horses to pass was left open.

All these stoppings were on the intake side, and at the upper side of a gobbing, rising one in five, there were two other openings to close. These two latter were filled up to the roof, also the other three on the intake side, and one of them, (2), was almost faced up with brickwork.

Firedamp Was Present at Stopping

In fact, stoppings were so tight that firedamp was showing at the stopping marked 1, thus proving that the old works were full of some mixture of gases. Suddenly the damp was forced out at the top of every one of the five stoppings which had been made with dirt, and four men in the road where stopping 1 had been made were slightly burned, and several rendered unconscious.

The men at stopping 2 suffered the least, three of them rushing away towards the pit bottom, and two remaining to help their less fortunate companions. It is due to these two, Boon and Daniels Jr., that the loss of life was only six instead of seventeen.

Was It Really an Explosion at Bignall Hill?

Not a single door was blown down, mainly due to the fact that the force came against all of them from the return air side. Early in the morning and before the closing of any of the stoppings was commenced, the roof near the point where the fire was supposed to be, was "bumping" or "weighting," and breaking the timber set up to the roof.

The writer, therefore, thinks that the disaster, erroneously called an "explosion," was entirely due to a fall of roof, forcing out the pent-up gases, which were described as the "afterdamp." The blast rendered some men unconscious and smothered others before the rescuers could get to them.

Was the Methane Undergoing Flameless Decomposition?

Some people may think that this is insufficient to explain why some of the men at stopping 1 were slightly burned, but even this is explicable. Prof. W. A. Bone, of Leeds University, has in the course of his experiments discovered that heat can be developed from the ignition of gas without flame, if the gas is in contract with a red hot porous surface.

It is not difficult, therefore, to imagine such a condition of affairs where there is a gob fire in a pillar of coal, as in the case under review. There certainly was no actual flame, or the firedamp issuing from the stopping would have exploded, and (if necessary) ignited the dust in the vicinity.

The force exerted although sufficient to throw down some of the men was insufficient to injure any of the doors. The opening of the doors at 3 and 4 permitted some of the "afterdamp" to foul the intake air current, and consequently as all these doors reclosed automatically, the men escaping from stopping 2 on reaching door 5 found "afterdamp," and had to retrace their steps and escape through the single door at 4, and thence into the intake air.

Similar Circumstance at "Talk O'The Hill"

It is a remarkable coincidence, that a similar disaster to the one under review occurred at a nearby colliery, called the "Talk o'the Hill," May 27, 1901, while the mine was not at work. This was attributed to the outbreak of a gob fire, but subsequent examination proved that there had been none, yet when the mine was being reopened, "afterdamp" was encountered. The mystery of this "explosion" has never been disclosed.

Another strange occurrence of more recent date, with a most violent exhibition of force, occurred at the Killingworth colliery in New South Wales, in December, 1910, and although a special Commission took evidence on this occurrence, the only result accomplished was to prove without doubt that the disaster was not due to the outbreak of a gob fire, as had been declared.

To return to the vital subject of gob-fires, Mr. Redmayne in his report adds some notes on the cause of spontaneous combustion in coal mines, but he does not touch on the subject of the late interesting discussion in Coal Age as to whether the intake-air side of a fire or the return side ought to receive the first attention.

However, he pointedly refers to the Reports of two New South Wales Commissions, 1897-1898, "on the cause of the danger to which vessels carrying coal are said to be peculiarly liable, and as to the best means that can be adopted for removing or lessening the same." The part of this commission's conclusions to which the writer would call attention is the following paragraph:—"Moisture in the air would seem to play little or no part in the heating of the coal."

Relation of Moisture to Heating

And in reference to this matter I am still of the same opinion which I have often expressed, viz., that moisture in coal

mines does encourage spontaneous combustion, but for the moment assuming that it does not, then I would propose that in the case of mines peculiarly subject to spontaneous combustion, the gobbings should be regularly and systematically sprinkled with coarse salt.

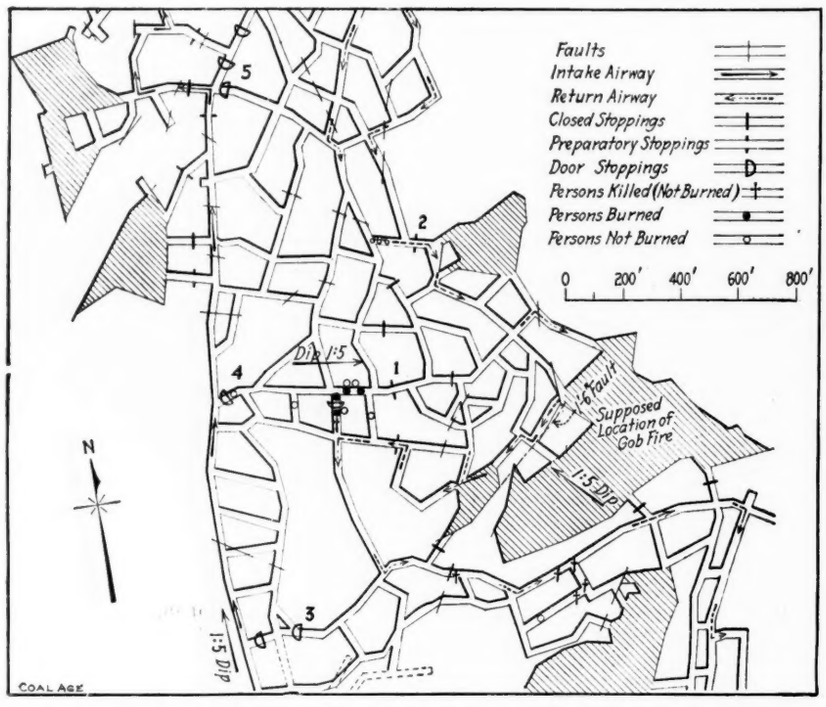
This would not only be a means of collecting and retaining moisture, but the salt itself would be a deterrent to actual combustion. It can also be advantageously used in all stoppings or dams placed in a mine, particularly when moist clay is used for the purpose of making tight joints against the roof.

Dampening Delays Oxidization

M. Fayol and Dr. Richters, (Waldenburg) demonstrated that damp coal absorbs oxygen less rapidly than dry, but this is only an experimental result, and before it can be accepted the meaning of the word "damp" needs to be stated. The U. S. Bureau of Mines also has observed that "the presence of moisture does not promote spontaneous heating." But, here, again, the word "moisture" needs a closer definition. When the writer refers to dampness he means the dew which is deposited on the gobbings by saturated or nearly saturated air, containing say, about 10 grains of water vapor per cubic foot.

When a chemist gives the result of his analysis of coal, he always gives the percentage of "moisture," and it would, therefore, be interesting to compare this component of coal in different beds. The writer would not be surprised to find quite a high percentage of moisture in the coals most subject to gob fires.

These seem to feed on their own gases, and, therefore, a reduction in the oxygen content of the surrounding air, as proposed by a well known authority does not give much hope of this idea proving a success. The mining interest would unstintedly welcome the practical discovery by any one of a safe means of dealing with the ever present danger in many coal mines.



THAT PART OF THE BIGNALL HILL MINE WHERE THE EXPLOSION OCCURRED

Further Notes on Coal Impurities

BY A. BEMENT*

Under the title of "Further Notes on Coal Impirities," Dr. William B. Phillips, on p. 111 of the COAL AGE of July 27, discusses certain arguments made by Mr. Wadleigh, who, in return, makes reply on p. 112, of the same issue. In this connection I would say that the differences between these two writers are more apparent than real. In general, it seems to me that the main difficulty encountered in treating a matter of this character, is a lack of proper definition of words and terms, as well as an inadequate vocabulary, with the result that it is not always possible for an author to make himself clearly understood, or for a reader to grasp his reasoning. I know in my own case that it has been necessary to adopt certain definitions and terms, as well as to enlarge to some extent the vocabulary employed. This has been treated elsewhere in some detail.*

Oxygen as an Impurity

Before saying anything about the main subject, I would prefer to illustrate my reasoning by the following examples: Considering the matter progressively, we find that what I define as the fuel mixture is coal plus impurities, these impurities consisting of ash and moisture. The *coal* of this composition is, of course, what is known as pure coal. In common parlance, the term coal is applied to what I designate as the fuel mixture; that this readily leads to confusion, however, is apparent, for example.

Two lots of exactly the same coal will be accompanied in one case by a very low ash content and in the other by a high ash content; ordinarily one of them would be spoken of as a good coal, and the other as poor, when, as a matter of fact, the coal in each lot is identical, the difference being only in the impurity associated with it in the form of ash and dirt.

In arriving at the term pure coal, I reason that coal is something which enters into combustion, evolving heat in the process. Now, neither ash nor moisture enter into combustion, nor do they produce heat. It is, of course, true that a certain small portion of the sulphur which is in combination with the ash, enters into the combustion, and this may be true with other ingredients of the ash, but the quantities are so small, the heat evolved so little, that their significance has no bearing in this argument.

With reference to the moisture, we know when the sample is heated in the laboratory that it is expelled with no production of heat, nor with any combustion. This is just what happens when fuel is put on the fire. With reference to ash, we find it on the bottom of the crucible, after ignition of the sample; likewise, we find it on the grate and in the ash pit after the fuel has been burned; therefore, from this standpoint, it is not only difficult but impossible to conceive of ash and moisture as being portions of coal. But it is very easy for us to adopt the views that ash and moisture are two impurities, associated with coal in the formation of what we may term a fuel mixture.

Now with reference to the coal; in other words, the pure coal, which is composed of combustible and noncombustible elements. These noncombustible elements are oxygen and nitrogen. While it is true that these two elements do not produce heat, we cannot conceive of coal without their presence, as they are as much an essential component of coal as any other ingredient. By no known

*Consulting engineer, 29 La Salle St., Chicago, Ill.

*"Power," April 25, 1911, page 628.

mode of reasoning can we have a conception of coal from which oxygen is eliminated; if we attempted to do so, the result would be that we would have a certain important part of the hydrogen in a free state; thus it would be a gas, not a solid, and with respect to the carbon, it might be in a very different condition, such, for example, as graphite, unsuited to ordinary combustion.

Again, oxygen is a very useful constituent of coal, because it gives us different varieties; for example, it is the constituent which determines whether coal shall be semi-bituminous, bituminous or lignite; therefore, it must necessarily follow that notwithstanding the fact that oxygen is not a heat-producing element, it is also not an impurity.

In the foregoing, oxygen has been treated from the standpoint of a constituent of coal, and it may be well to look at it from the viewpoint of combustible constituents. Considering the combustibles in the abstract, simply from the standpoint of combustible material, and not as a constitutent part of coal, it would be permissible to consider oxygen as an impurity, and this is the intention of David White and I. C. White in calling attention to the fact that oxygen does not produce heat.

Even if it should be assumed that oxygen is an impurity in coal, the reasoning is not complete, because all of the oxygen is considered to be in combination with hydrogen, forming water; thus it would be the water of combination, a larger quantity, that would be the impurity instead of oxygen.

The following illustrations may serve to further elucidate the matter:

COMPONENTS OF COAL

Combustibles	*Essential Non-Combustibles*
Carbon	Water of Combination
Hydrogen	Nitrogen
Sulphur	

Coal = Combustible + Essential Noncombustibles. Fuel Mixture = Coal + Impurities, these impurities being ash and moisture.

SULPHUR

With reference to the matter of sulphur, Mr. Wadleigh has shown that the sulphur content of the fuel mixture has no significance on the clinkering of the ash, and in doing this he has presented an answer to the demands of misguided customers, who have assumed that the sulphur content governed this point.

Mr. Wadleigh is dealing with a feature of coal purchase and specifications, while Dr. Phillips discusses an entirely different point, the influence of sulphur on the clinkering of the ash. Mr. Wadleigh is talking about the impressions obtained by a coal buyer, while Dr. Phillips is discussing a matter of fact. They are both right as I look at it, the only difficulty being that the arguments have not been fully understood.

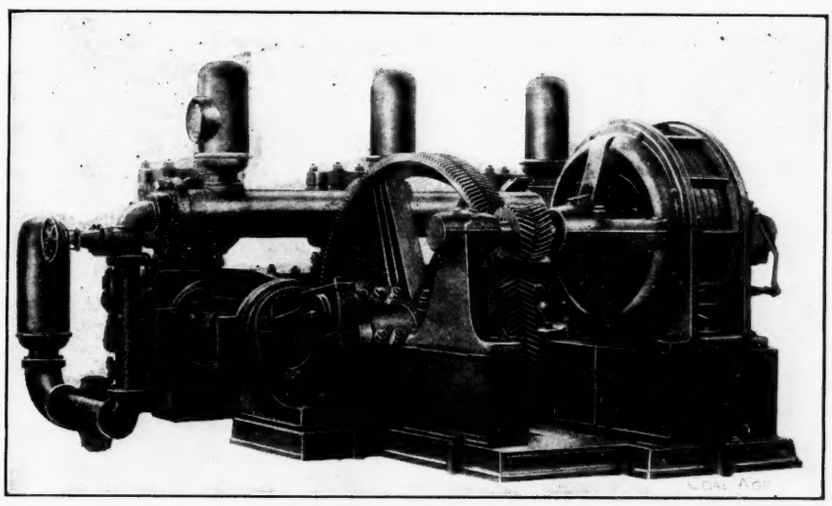
Handling Mine Water

Mine pumping equipment covers such a wide range of conditions as to capacities, working heads, and character of water handled, that many types of pumps have been designed to meet the varied requirements. The accompanying illustration shows a high-power mine pump built to handle acidulous water in a coal mine; its design and construction embody many features of special interest and great value for use in mines where such water exists.

The pump is a horizontal, triplex, single acting, outside packed, plunger pattern with pot chamber type of water end. The diameter of plunger and the length of stroke is 12 in. The entire water end is lined with wood throughout to prevent destruction of castings by the action of the acid in the water handled; the metal is made extra thick, to allow for deterioration of outside surfaces from the same cause. The valve parts and by-pass piping are of acid-resisting bronze, while the same metal is used for lining throats and glands and for capping the ends of plungers. The pump makes a speed of 48 r.p.m. from a motor speed of 375 r.p.m., and has a capacity of 825 gal. per min. against a 400-ft. head.

The water end is highly sectionalized with separate cylinders and valve pots, rendering it easy to handle and repair, and localizing any damage due to the breakage of parts. Special flanges on valve seats make them easily removable, and, at the same time, hold them firmly in place; the valves are of the double-ported pattern of large area; rubber is used for the facing . A by-pass equipment makes it possible to start the pump with practically no load on the motor, and priming piping and valves assure prompt and reliable starting. One large vacuum chamber and three air chambers guarantee smooth operation—three air chambers requiring less headroom than one of an equivalent volume. Swing bolts and slotted flanges expedite removal of parts.

The power end of this pump is of heavy engine type construction. The crank shaft is a steel forging, of the single throw type, runing in chain oiling, split bearings in substantial frames; cast steel crank discs, with pins, are pressed on, and keyed to the shaft. Each yoke connecting cylinder and frame is split in a horizontal plane; this facilitates replacement of any of these heavy castings without completely removing others. The design of the yoke and the large diameter of the crossheads and guides render the gland studs and the adjustments of shoes and connecting rods very accessible. The connecting rods are interchangeable steel forgings with solid crosshead ends and forked crank ends. Both ends have wedge adjustments.



VIEW OF PUMP, SHOWING HERRINGBONE GEARS

The gearing is of the herringbone type, made by the Falk company, under the Wuest system patents, and is substantially supported between two frames. Maintenance of alignment is insured by a heavy motor base and an outboard bearing for the motor shaft. The method of mounting the motor makes a compact arrangement, and the height of the base will permit continued operation, even with a considerable depth of water on the pump-room floor.

This pump has recently been furnished by the Deane Steam Pump Co., of Holyoke, Mass., for use in the anthracite district near Wilkes-Barre, Penn.

Though attacked in a resolution before the miners' convention as a "labor leader in the grasp of capitalists," John Mitchell, former president of the organization, received more votes than any other candidate for delegate to the American Federation of Labor.

Mining a Thick Vertical Coal Seam

By John W. Powell*

The mine is opened by driving a rock tunnel from the surface to intersect the seam at the bottom of the basin or at a depth of, say 1000 ft. below the crop line at the surface. Two methods of working are described, namely: The "inclined method" and the "vertical method." The results obtained by these two methods are compared.

*Mine manager, Columbia Coal & Coke Co., Coalmont, B. C., Canada.

Some time ago, in my reply to the inquiry of Charles F. Sherman, COAL AGE, May 25, p. 1085, I stated I would be glad to answer the question he asked in regard to the best method of working a thick vertical coal seam, as my experience has made me greatly interested in the subject of working coal under all conditions. At that time, I asked for further information, but, since receiving this from Mr. Sherman, my time has been much taken up and I have been unable to give the matter further attention until now.

The property being located, as Mr. Sherman states, "in a mountainous region where the surface conditions are rough," I would suggest that it might be practicable to drive a rock tunnel to intersect the coal seam at a depth of, say 1000 ft. below the surface or outcrop of the seam. This tunnel should be located as near the center of the property as is practically possible, so as to enable the property to be developed rapidly and to secure quicker returns than if the seam were to be opened on the end of the property. The tunnel should be driven single and wide enough to accommodate two tracks and a manway on one side for the purpose of ventilating the tunnel till such time as an air shaft can be sunk. A temporary brattice should divide the manway from the tunnel, so as to provide for the circulation of an air current and conduct the same to the face of the tunnel. This brattice should be provided with relief doors to prevent its possible destruction by the concussion of the air, in blasting.

When the development has progressed sufficiently an upraise can be started at any suitable point in the mine, to provide for the necessary air shaft. When this air shaft is completed the permanent ventilating fan should be set up on the surface at that point. I would suggest that it may be possible, in the later development of the mine, to use one or more small fans to advantage, located over upraises driven to the surface at convenient points in ravines where the depth is shallow.

I consider the opening up of a steep-pitching coal seam by a rock tunnel, as described, an ideal system where the same is practicable, for the reason that it eliminates the pumping of water and hoisting of coal, which are always necessary when a shaft or slope is adopted. These items render the later operation of steep-pitching seams very expensive. I wish to state that this is the system on which the Columbia Coal and Coke Company's mine here at Coalmont has been opened. The rock tunnel of this mine cuts the coal seam at a distance of 1800 ft. from the portal. The depth of the seam measured on the dip of the strata, at the point where the tunnel intersects the seam, is about 700 ft. below the surface; and this increases to a depth of 1000 ft. as the entries advance to the right and left of the tunnel. The angle of inclination of the coal seam varies, in this case, from 45 to 75 deg.

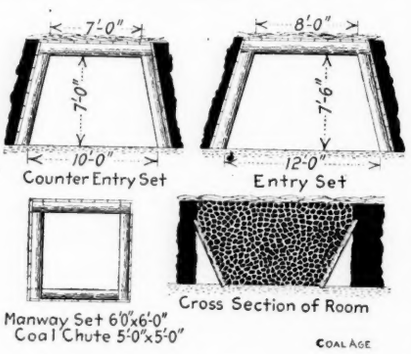


FIG. 1. SIZE AND STYLE OF TIMBER FRAMES AND TIMBERING

At the point of intersection of the tunnel with the coal seam I would start the main entries or gangways, turning these to the right and left and driving them on a grade of one-half of one per cent., or a rise of six inches per hundred feet. A parallel or counter entry to be used as a return or intake aircourse, as desired, should be driven in the seam about 50 ft. above the main entry. The main entry should be of such a size as to provide for timber frames having an 8-ft. collar and a 12-ft. spread and measuring 7½ ft., in the clear, above the rail. This will allow for a ditch at the side of the track, 2 ft. wide by 18 in. deep, along the hanging wall. The counter entries should be timbered with 7-ft. collars, 10-ft. spread and measuring 7 ft., in the clear, above the rail. All the dimensions given are in the clear or on the inside of the timbers, as shown in the cross-sections, in Fig. 1.

The cross-entries or gangways and counters should be driven to the boundary, on a property of this size. This would not take long as they would only have to be driven about half a mile in each direction from the tunnel. Such a system would certainly prove most advantageous in the end. If a considerable tonnage is desired, in the early development of the mine, this can generally be secured by driving up some rooms and taking out the coal that comes down the manways on the side of the chutes. This generally amounts to about 75 per cent. of all the coal extracted from the solid, the remaining 25 per cent. being stored in the chute. Under no consideration should any of this loose coal, in the chute or breast, be drawn until the cross-entries reach the boundary of the property, and the work of drawing back the room-pillars has begun.

TWO GENERAL METHODS OF WORKING

I am about to describe two general methods of proceeding, in the working of a vertical coal seam, after driving a rock tunnel, as stated above, to intersect the seam. These two methods or systems are illustrated by the vertical sections shown in Fig. 2, *A* and *B*. The system shown on the left and marked *A* may be called the angle or inclined system; while that shown on the right and marked *B* may be called, by way of distinction, the vertical system. In both of these systems, the entries, counter entries and coal chutes are timbered and have the general dimensions given in Fig. 1. In this figure is also shown a cross-section of a room or "breast." The central portion of the room, as shown, is filled with loose coal, from the battery at the mouth of the room, up to within a short distance of the face. The triangular spaces, on each side of the room, formed by the inclined timbers or "jugglers"; as they are called, set obliquely against the rib serve as manways by which the miner reaches the working face and also to ventilate the breast. This form of room is used in working on the inclined system, Fig. 1 *A*.

INCLINED SYSTEM OF WORKING A VERTICAL COAL SEAM

Having driven a rock tunnel to intersect the seam at a distance ,approximately 1000 ft. below the surface or outcrop of the seam; and having driven entries or gangways and counter entries or airways above them, to the right and left of this tunnel, in the seam, and extended these to the boundary of the property; coal chutes, 5x5 ft. are driven up from the gangway to the counter entry above. These chutes are driven on 80-ft. centers, measured on the gangway. They are not vertical, but are driven up on an

angle of about 60 deg. This provides one chute for each room, as shown in Fig. 2 *A*. The chutes are 5x5 ft. in section and must be well timbered, as shown in Fig. 1, since a large tonnage of coal must pass through them.

Where each chute strikes the counter entry a room is started, on the high side of the entry. The room neck is driven narrow (3 yd. wide), for a distance of 7 or 8 yd., and then widened out on an angle of 45 deg. to a width of 30 ft. This portion of the room and the neck are driven only 7 or 8 ft. high, measured from the floor of the seam to any convenient parting in the coal, where a good roof can be secured.

From the point where the room is widened out to the full width (30 ft.), the whole face of coal is taken out ahead of the miner, who stands on the loose coal, which supports him at the working face. It is necessary to set the jugglers and keep the manways as close to the face as possible. The loose coal is drawn from the battery, at the mouth of the room on the counter entry, and allowed to fall down the chute to the main entry, where it is loaded into cars and hauled out of the mine. The center of the room being kept filled with loose coal, it will not be necessary to set any timbers in this part of the room, except what may be required to support a bad slip in the roof. As the loose coal occupies about two-thirds more space than it did in the solid, it is necessary to draw the coal from the chute, from time to time, in order to give the miner room to work.

As will be seen on the plan, a manway is driven up in each alternate pillar between the rooms, to enable the miner to reach the working face. As shown, these manways reach only to the first crosscut in the pillar; above this point the miner travels on the manway, in the side of the breast. Under ordinary conditions, the rooms may be driven 30 ft. wide with pillars 40 ft. wide between them.

The plan Fig. 2 *A*, shows the rooms as having been extended to the boundary. The dotted lines represent that portion of the workings that has been drawn back in robbing the pillars. In this work of extracting the pillar coal, chutes 5x5 ft. are driven up through the center of each pillar and crosscuts are then driven to divide the pillars into blocks. The work proceeds as the coal is drawn from the rooms. A few well-placed shots, in the pillars, are sufficient to dislodge the whole block, the coal falling into the adjacent rooms. It will be readily seen that working a vertical coal seam at an angle of 60 deg., as here explained, will greatly simplify the process of mining by making it easier to get up and down the manways; and less coal will be crushed and broken in sliding down the chutes, than in the vertical method.

Vertical System of Working a Vertical Coal Seam

In the vertical system shown on the right, Fig. 2 *B*, as in the inclined system just described, a rock tunnel is first driven to intersect the seam; and gangways with counters or airways are then extended to the boundaries, to the right and left of the tunnel, in the seam. When this has been done three chutes are driven up vertically, or on the full pitch of the seam, as the case may be, at intervals of 500 ft. These three chutes consist of a center manway, 6x6 ft., flanked on each side by a coal chute 5x5 ft. The manway is partitioned off to provide for a timber chute, the timber being pulled up by a small hoist operated by compressed air or electricity. The motor is placed on a truck so that it can be run along the entry and used at any point where desired. The manway proper is provided with a good substantial ladderway and landing platforms at the entrance to each room, or 56 ft. apart, the rooms being driven on 56-ft. centers. Two sets of three chutes each, as described, are shown in Fig. 2 *B*. This leaves a solid panel of coal, practically 425 ft. wide, between each set of chutes.

Upraises are now started from the gangway and driven up to the counter or airway above, on 60-ft. centers. Rooms are turned off on the strike of the seam, or level, to the right and left of each set of chutes. The rooms are driven on 56-ft. centers and 16 ft. wide; or they may be opened the full thickness of the seam, if desired. These rooms are driven from each set of chutes and produced to meet in the center of the panel, which makes the length of the rooms about 70 yd. (210 ft.) Each room is provided with a dump car of about 25 cu.ft. capacity, which is operated on a track of 18-in. gage, iron rails being used weighing 16 lb. per yd.

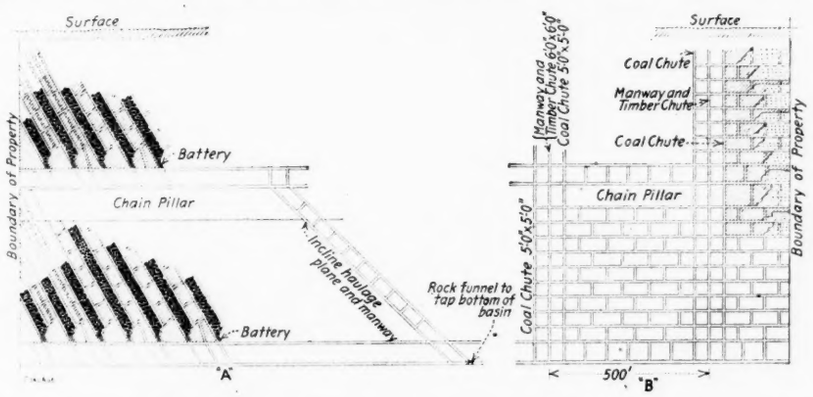


FIG. 2. VERTICAL CROSS-SECTION, SHOWING THE "INCLINED" METHOD ON THE LEFT AND THE "VERTICAL" METHOD ON THE RIGHT, FOR MINING A VERTICAL COAL SEAM

It will be observed, in Fig. 2, *A* and *B*, I have divided the 1000 ft. of vertical depth into two lifts of 500 ft. each. I consider this is absolutely necessary in a seam of this thickness, pitching as it does nearly vertically. It would not be practicable to drive up rooms 1000 ft. long, under conditions of this kind. Were this to be attempted a large percentage of coal would be lost, which could otherwise be secured. In order to reach the second lift I would drive a steep incline or upraise, from the lower lift, starting at the intersection of the tunnel with the seam. In Fig. 2, I have shown this incline driven at an angle of 45 deg; or if desired, a manway and horseway could be driven at a less angle, say 35 deg. The coal from the upper lift can be lowered by gravity to the tunnel below.

Robbing the Pillars

In the vertical system, as in the inclined system, the work of drawing back pillars is commenced at the boundary or in the center of each panel. This work should be started at the top of each lift and proceed from there downward. As shown in the vertical section, Fig. 2 B, the coal is worked back in steps, or sections, each section being kept about 8 yd. in advance of the following one, the miners in the upper sections standing on the loose coal or on a temporary platform. In the figure, the pillars are shown as cut into small blocks by upraises driven between the rooms.

I consider this a much safer and a cheaper system of working a vertical seam.

In both systems described, the upper-lift workings must be kept in advance of those in the lower lift. The chain pillar separating the two lifts is robbed out by extending rooms up through it, from below, and bringing back the pillars as previously explained.

In closing, I would say that if the conditions are such as to make impracticable the driving of a rock tunnel as suggested, I would sink a double-compartment shaft, vertically, to be used as a hoisting shaft; and supplement this with two single-compartment shafts, one to be used as an air shaft, the other for the lowering and hoisting of men and materials. I would divide the area into two lifts and install the same system as I have described.

The Terra del Fuego Coal Field

By Henry W. Edwards*

A description of one of the world's southernmost coal operations. The product appears to be a medium grade lignite and is used exclusively for home consumption, principally in the canning industry. The field has rather interesting historical associations.

*80 South Pennsylvania Ave., Denver, Colo.

Most of the coal-bearing formation in this land is under the government of the Republic of Chili, being in the Department of Magalanes. It is a land of continual furious storms, rain and fogs. Before more strictly following the idea of the title of this essay, it will be as well to give the reader an idea of the country and its conditions.

Geography

Situated at the southern extremity of the South American continent, 6000 miles in a direct line south of New York, and 7000 miles as covered by a ship's course, it is within range of the Antarctic ice. The tip end of the Americas is formed of myriads of islands and a labyrinth of channels and inlets of both the Atlantic and Pacific Oceans, and our ideas of it have hitherto been derived mostly by reading the observations of seamen, who have, naturally enough, taken note only of those features which appertained to their own calling.

The west side and the southern extremity, terminating in the island of Cape Horn, are mountainous and abrupt and are swept by continual fierce gales of wind carrying a mixture of rain and snow, or sometimes hail; there are not on an average of more than a dozen days a year on which rain does not fall and not more than 25 days in which the gales are not blowing.

The Straits of Magellan offer a safe passage for ships from ocean to ocean at the point where the main continental land ends and the system of islands commences 200 miles north of Cape Horn itself; the route followed by ships is about 300 miles from Atlantic to Pacific. Just about midway between the two oceans is the town of Sandy Point, or Punta Arenas, the metropolis of this land and at present the center of the coal industry. The town claims a population of 12,000 people.

The coal is, properly speaking, a lignite and of very recent geological age, indeed it has been classed by the Swedish explorer Dr. Nordenskjold and by Prof. H. Babinsky as of Miocene Age. The principal mining is carried on within four miles of the town of Sandy Point. This town, established in 1851, as a penal settlement, now boasts a water and sewerage system, two banks, and is the seat of the government of the district. There are two newspapers and it is the enforced port of call for all steamships passing through the straits.

It is also the only distributing point for both the Chilian Province of Magalanes and the Argentine Province of Patagonia, both districts with a growing sheep and cattle ranching industry. It is therefore in a very advantageous locality for doing a good business in the coal trade, and this would be of still greater importance if it were not that the lignite is of too low a grade to serve as fuel for the steamship lines which use this route. The local boats, however, are good customers, as far as their needs go, for the local fuel.

Historical

The lignite was first discovered in 1580 by Captain Pedro Sarmiento de Gamboa, who was commissioned by the King of Spain to fortify the straits with a view to preventing the unauthorized passage of foreign shipping. He established himself a few miles from the present town of Sandy Point, and the outcome of his efforts may be gathered from the name the spot bears to this day—Port Famine. He found the beach to be littered with débris from the seams of lignite outcropping in the steep bluffs a little back from the water's edge. Having tested some of the fragments in the cook stove of his ship, he reported to his government that the coal was "better than French coal."

The first recorded work seems to have been done in 1870 by James Armett, about four miles northwest of the town, on the left bank of a creek called the Rio de las Minas. He built four miles of track, of 3-ft. gage, and a loading wharf at the water front. In 1872 the output was officially reported to be 2068 tons, but in 1875 the mine was closed, and remained idle until 1897, when Armett again headed a company for the purpose of exploiting the property, giving the mine the name of "Loretto."

The present track is nine kilometers long, of one meter gage, and there are two locomotives and a dock 800 ft. long to accommodate shipping. Owing to the friable nature of the lignite and the amount of fines produced by handling, Armett's idea is to manufacture it into briquettes. Machinery capable of producing 1000 tons of briquettes per month was purchased in Germany and installed. These briquettes are in regular use in the neighborhood for domestic purposes, for the local steamships and for the other small industries of the country. The long journey steamships, however, still continue to purchase imported coal supplied from a hulk kept floating at a convenient distance from shore.

The Coal Measures

The workable seam crops out on the face of a steep bluff about 120 ft. above the creek bed, the hills behind and above gradually rising to an elevation of about 1000 ft. above sea level.

In ascending the bluff we find, commencing at the bottom:

Feet	
20	clay slate.
2½	poor lignite,
77	various strata soft sandstone,
1½	clay slate,
2	poor lignite,
3	soft sandstone
7 to 10	workable lignite.

Above this there are other seams further up the hill upon which no work has been done. The lignite shows no pyrites or other sulphur-bearing minerals. It does not disintegrate even on long exposure to the air. The ash resembles wood ash rather than coal ash and does not effervesce with acids. The coke formed by it in the laboratory crucible retains the structure of the original material, shows no signs of melting or swelling and is solid, hard and lustrous.

Distillation of two samples in a small retort gave the following results:

	A	B
Water	24	24
Tar	7 4	13
Coke	43	44
Gas and loss	27	19

The water condensed from the above has neither an acid nor an alkaline reaction. A more searching analysis of the two samples gave the following:

	A	B
Water (by drying at 100° and less)	16.5	15.3
Water (by drying at 100° and more)	4.8	5.4
Carbon	57.1	59.2
Hydrogen	4.9	3.1
Oxygen and Nitrogen	7.6	6.4
Sulphur	0.08	0.1
Ash	6.9	8.0
	2.12	2.50
	100.00	100.00
Specific gravity	1.27	1.29

The lignite is of a fine jet-black luster with a choncoidal fracture. A rough measurement of the gas yielded by another sample from the same seam gave from 10 grams of lignite, 2.2 liters of gas, equivalent to 7050 cu.ft. per ton. This gas burned with a clear flame and in passing through a solution of copper sulphate gave a very slight discoloration due to sulphuretted hydrogen.

An excellent geological section of the formation is afforded by the steep sides of the cañon through which the creek runs. Several hundred feet of Tertiary and Quaternary deposits are exposed, in which are represented several different

and quite distinct horizons. For the most part the strata are rich in fossils, the beds being of marine origin, the sandstones carrying oyster shells identical in appearance with the ordinary oyster of our day, while the lignite bears the imprints of undoubted terrestial vegetation.

The soft sandstone, or grit, seems to be formed chiefly of small rounded grains of quartz with black specks of oxide of iron and a few flakes of mica. Some of the beds are of a slightly greenish tinge, apparently due to a slight admixture of pyroxene or hornblende. The presence of hornblendic rocks south and around Sandy Point accounts for the presence of this mineral. All the strata are approximately horizontal, there being a very slight dip toward the northeast.

The Different Openings

On the north shore of the deep bay known as Skyring Water, to the northwest of Sandy Point is another exposure of the same series of beds. Some work was done here in the early eighties by a German resident of the country, Julius Haas, at the expense of a Buenos Aires company. Here there are at least two known seams of workable lignite, the lowest of which outcrops at the water's edge, the end of their 250-ft. entry being several feet below the level of high water.

This company had a small steamship for the transport of their product to Sandy Point, but they seemed to have been unable to make a financial success of the operation. The wreck of their boat seems to have put the finishing touch to the enterprise after a few short years of a struggling existence. This property is known as the "Mina Marta."

On the opposite shore of the same body of water is another outcrop upon which some work has been done; this was for a time in the hands of a French syndicate, who sent out a competent geologist to make a thorough investigation of all the circumstances. This gentleman, Prof. H. Babinsky, visited most of the known lignite showings in the country and published an account of his investigations in the "Annales des Mines" for the year 1904. Nothing has been done in the way of shipping coal from here, and a few test holes are all that can be seen today.

On the Tierra del Fuego shore, in the neighborhood of Nose Peak, the same lignite and the same series of beds are to be seen. This, like all the other discoveries, is quite close to the sea shore, the extreme difficulty and toil in penetrating the interior in most localities of the island have so far discouraged attempts to search in this direction. Beyond the mere act of discovery and the taking of a few samples as evidences of that act, nothing whatever has been done at Nose Peak. The lignite here is of exactly the same character as that already described with the exception that it appears to contain visible specks of pyrites.

At Slogget Bay, on the extreme southeast portion of the island, identically the same beds occur in the bluffs fronting the sea. Nothing whatever has been done here and no efforts have, so far, been made to ascertain if the formation is continuous across the island from Nose Peak. Such a task would probably be of greater magnitude than the present prospects of the trade would justify. All the deposits described are in Chilian territory with the exception of Slogget Bay, which is in Argentina.

Future of the Industry

For mine timber use is made, either of the beech, of which there is a very plentiful growth but which is not very durable, or of oak, which is more durable but which grows to only a small extent. There is a very considerable growth of a tree locally called the "coigue" which, however, is useless for any purpose.

The future of the industry must depend on the growth of commerce and industry in the locality itself. The low calorific power, which may be figured at 60 per cent. the value of the ordinary grades of bituminous coal, effectually prevents any long distance trade. There is a small opening for supplying the local steamboats, and there is a promising metal-mining industry, both of copper and placer gold. The copper industry, once established, will most likely be the most extensive consumer.

The prolific marine life in these waters has lately attracted attention and the canning industry has made its appearance; so far it is confined to canning the giant crab, which article finds a ready market in Buenos Aires. As the canning business grows so will their demand for fuel improve the coal-mining outlook. The gold-mining industry has been a struggle for 30 years, but a new era has opened out with the introduction of powerful dredging apparatus; should this prove successful it will be not only a good customer in itself, but will attract population to the country, which, in turn, will widen the local coal market.

A Locked Cap Box for Mine Use

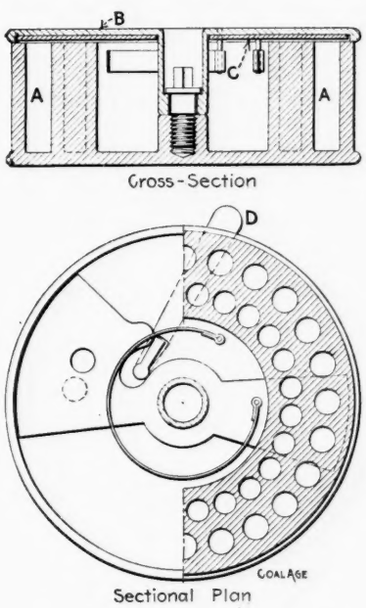
By Joseph Daniels*

The provision of some suitable arrangement for carrying caps in the mine is obvious. Not only are they a source of danger to the persons having them but when misplaced and lost they are liable to result in a serious accident. In the accompanying illustration is shown a carrying case patented by A. F. Hamilton, Master Mechanic of the Western Fuel Co.

*University of Washington, Seattle, Wash.

This consists essentially of an aluminum cylinder in which holes *A* are drilled for holding the caps. The box is cored out in the middle except for a small stub left in center for attaching the cover.

The cover is made in two parts, *C* and *D*, both having openings which correspond with the holes drilled in the main part of the box. While these disks are free to move in any direction, there is a mechanism which prevents any two holes being in line together and at the same time in line with the hole containing the cap until the key *D* is inserted. When the key is in place, the two covers may be rotated differentially until two openings coincide, and this opening is then superimposed over one containing a cap in the main part of the box and the cap permitted to drop out; immediately on releasing the key, the box closes automatically. These boxes are made with a capacity of 30, 45 and 60 caps, the weight for the 45 size being 16 oz. when loaded.



Sketch of Locked Cap Box

With this box only one cap is exposed at a time, and the operator does not have access to the entire contents because the key for unlocking the box is kept on the surface where they are cleaned and filled. The box locks itself automatically, there is no danger of sparks when using it, and it may be left any place without danger of the caps being stolen. The caps are free from abrasive contact with each other and may be carried on the person without danger as is sometimes the case when crawling on hands and knees through fallen entries, manholes, ventilators and the like.

Where chain-breast machines are used in a thick seam, some of the coal in front, and above the cut, should be broken off, in order to permit the coal to roll after the shot is fired.

Current Coal Literature

The Best Thought Culled from Contemporary Technical Journals, Domestic and Foreign

The Dangers of Rolls

One of the dangers connected with horsebacks and rolls is the fact that they demand heavy shooting. Most men overlook the fact that an explosion is almost as likely to occur from a heavy shot in a clay roll as in an equally large shot made in solid coal, granted that in each case an equal amount of dust is present. The danger arises not so much from the material in which the shot is fired, but from its size, from the possibility of its blowing out because drilled on the solid and from the presence of coal dust.

The explosion at Franklin No. 2 mine, Johnstown, Penn., Oct. 31, 1909, arose from the shooting of a roll. The coal was 1 in. thick and was shot from the solid by dynamite. Only the front of the three holes was broken out and the inspectors thought that the coal dislodged was broken into fragments and fine dust by the violence of the blast and that the ignition of the pulverized coal which resulted, fired the dust of the roadway.

Elk Garden Explosion

The following account of the Elk Garden explosion from the report of the Chief Inspector of West Virginia, John Laing, for the year 1911, is of interest in this connection:

"An explosion occurred at No. 20 mine of the Davis Coal & Coke Co., near Elk Garden, Mineral County, W. Va., on Apr. 24, 1911, at 8:30 o'clock a.m., causing the death of 23 persons.

"This mine is operated in the Lower Kittanning seam, the coal being about 4½ ft. thick. The seam is irregular and is full of rolls and clay veins. The mine is dry and dusty and it was known that explosive gas was liberated in some sections. This was local, however, and at no time was the mine known to emit gas in dangerous quantities.

"Immediately after the explosion, a rescue party was organized by Supt. Robt. Grant. Five miners escaped from the mine after the explosion. These men were working in a section near the crop, almost one mile distant from where the explosion occurred. Because the mines were very wet between where they were working and where the men were killed, the explosion died out before it reached them and they were enabled to reach the surface in safety.

"The fan was not damaged so that it would have been possible to conduct the rescue work without hindrance, but as the fan forced air into the mine, it was sometime before the rescue party could enter, for those in charge of the relief corps did not deem it advisable to reverse the air current for fear that some of the men might be on the airway.

"On arriving at the working face of what is known as the "Dean air course," we discovered that a shot had been fired in the left side of that heading, and that a hole had been drilled in the solid. The air course had just struck what is known as a "fault" or clay vein and the intention in drilling the hole was to make a mining in the rock, so that the top slate could be blasted down afterward.

"Where the hole was drilled, there was a streak of coal about 2 in. thick and they had drilled the hole in this streak. When the shot went off it blew this in a fragmentary and pulverized condition down the airway, which was heavily charged with fine coal dust. As shots had been fired a few minutes before this in this same entry, the dust from these was still in suspension. Thus, every condition favored an explosion.

Cause was Quite Evident

"As evidence that this shot had just been fired and was the cause of the explosion, one of the men who worked in this entry, was found lying with his hands still gripped to the battery which was used to explode the shot, and the lead wires were traced directly to where the shot had been fired.

"This man was quite badly burned and showed signs that he had been killed almost instantly when the shot went off. The force of the explosion was easily traced from this point through the entire mine, as all the brattices, mine cars, etc., were thrown toward the outside from this point and in no other part of the mine were there any signs of flame.

'After a thorough examination of the mine, it was clear that had the workings been damp or had they been sufficiently watered, as they should have been, the disaster would not have been as widespread as it was; and there is no doubt in the minds of any of those who investigated the mine workings, but that dust was the main factor in the explosion. While the mine was known to liberate a small amount of gas, it was quite evident that this was not the cause of the explosion as the men had been at work with naked lights at the face of their working places for some time.

Evasion of Rules

'The rules of the mine required that no black powder be used underground. A permissible explosive known as "Monobel" was the only powder permitted by the district mine inspector and the company. It would be unfair, perhaps, to say that black powder was used in the shot which caused the explosion.

We have every reason, however, to believe that it was, as we found black powder in the mine, which was proof to us that the miners were using it, even against the advice of the district mine inspector and the rules of the company. My own convictions are, that if the hole had been properly charged and a permissible explosive used exclusively, the accident would not have happened. By violating instructions, this man took his own life and the lives of 22 others, some of whom, no doubt, were breaking the law as flagrantly as himself.

New Requirements

'The only way in which the department can eliminate accidents of this kind is by an absolute prohibition of all shooting during the day shift, or when men are working in mines which are dry and dusty. It can also require that expert shot firers be employed for the purpose of doing the blasting after all men have left the mine.

"A ruling of this kind will for a short time work more or less hardship on the miners and perhaps curtail the output of the colliery, but it is the only way that I see to prevent a repetition of the accident and I have issued a circular letter to each of the inspectors of the different districts to put this ruling into force at once.

"We cannot permit danger of this kind to exist where every man's life depends on the most reckless miner. We expect to meet with some complaints and opposition against this order, but we propose to execute it regardless of how it may be regarded by either miners or operators."

The rules issued to mine inspectors which follow in the report, do not, however, refer at all to shooting in dry or dusty mines but solely to solid shooting. The rules require the employment of shotfirers, the maintenance of faces in a V-shape, the use of clay or loam tamping, and forbid anyone but the shotfirer to carry squibs or detonators into the mine.

External Tamping of Shots

Special Correspondence

Lemaire proposes that Taffanel barriers be placed where they will prevent an explosion rather than so as to control one after it has started. He places a pile of dust, external tamping he terms it, in front of the shot hole and finds that it serves to deaden the flame of the explosion so that gas is not ignited.

Victor Watteyne* and Emmanuel Lemaire† have published in the regular official organ, *Annales des Mines de Belgique*, the results of a series of tests conducted at the Frameries Experimental Station. M. Watteyne will be remembered here as the Belgian expert who visited the United States at the invitation of the President to investigate the explosions at Harwick, Naomi and Monongah. The account of the experiments made and the conclusions reached is briefly recorded below.

Lemaire's External Tamping

E. Lemaire suggested that experiments be made to ascertain the effect of depositing incombustible dust near the mouths of shotholes for the purpose of cooling or allaying the flames caused by the explosions of heavy charges. In order to discover the value of the suggestion, the dust was placed in a heap in front of the bore hole so as to cover the latter completely. This method of stone-dust immunization is termed "bourrage extérieur," or external tamping. Further experiments are still to be made to demonstrate its worth.

The more dangerous explosives were chosen and the value of the tamping was compared by exploding other charges not immunized by this original method. Experiments have been made using No. 1 dynamite* in charges reaching 1.54 lb. Favier No. 1 powder was also charged in quantities under and up to 2.01 lb. The charges were made without the regular tamping placed within the hole. The immunizing dust consisted of powdered shale, pulverized chalk and sand, the amount being proportioned to the size of the charge it was expected to immunize.

It will be readily understood that the presence of firedamp makes immunization of a shot more difficult. So far tests have only been conducted with charges not exceeding 0.882 lb. of dynamite. In this case, external tamping weighing 8.82 lb. and as low as 4.41 lb. proved effectual. There have, however, been an insufficient number of tests made.

Dust Must Be Nonbituminous

The tamping should contain no bituminous matter. Experiments with boiler cinders containing a certain proportion of partly burned coal proved ineffectual. But the use of external tamping is not advocated as a protection against the use of explosives of an unsafe character. It should be used only to make assurance doubly sure when a permissible explosive is used. The stone dust can be placed on the ground, on a shelf, or other support. The tests were made with shots blown out completely or partially, because such shots are more to be dreaded than those which are properly stemmed, but it is purposed to try it on other types of shots later. Some blasts cause flame to escape by fissures, and it is hoped that it will be found that by spreading the dust the evils arising from this irregular and uncertain flaming may be satisfactorily met.

How To Estimate Dust Needed

The following formula is suggested for a computation of the amount of inert dust required for providing safety, and from it the calculated quantities given in the tables accompanying this article are derived.

$$P = \frac{Q}{1080\,C}$$

where P is the weight of incombustible dust expressed in pounds, C the specific heat of the same, and Q the amount of heat in British thermal units, which is generated by the explosive charge, a deduction being first made of the amount of heat necessary to raise the products of the explosion to 1112 deg. F. The specific heat of the materials used being taken roughly as 0.20, the above formula can be written

$$P = \frac{Q}{216}$$

But in these figures there has been no allowance for the heat absorbed in the expansion of the gases nor is there any allowance for the velocity imparted to the inert material.

Description of Tests

The tests were carried out in a gallery measuring 6 ft. 6¾ in. square and 98 ft. 5 in. long. As a rule two cartridges of the explosive were fired without stemming in mortars of 2.16 in. and 2.75 in. diameter, with their center lines raised 15¾ in. above the floor. The incombustible powder was placed on a board nearly 10 in. wide, laid across the gallery and touching the mouth of the cannon, the dust being shaped like a cone, the point of which stood usually from 4 to 6 in. above the bore.

The coal dust used was of three kinds. Some contained from 20 to 22 per cent. of volatile matter, other showed 25 per cent. on examination and the third dust 35 to 36 per cent. This was either placed on the floor or suspended in the air of the gallery.

IMMUNIZATION SECURED BY INCOMBUSTIBLE DUST.

Dynamite No. 1	Pounds of Inert Dust: Calculated	Which Immunized	Failing to Immunize
0.44	2.87	4.14-2.20-1.10	
0.66	4.41	8.82-2.20	1.10
0.88	5.73	8.82-7.05-5.73-5.29	
1.10	7.28	8.82-6.61-5.29-3.97-3.53	1.10
1.32	8.82	8.82-6.61-4.41-3.31	
1.54	10.14	6.61-3.31	

It should be noticed that a charge of 1.54 lb. of dynamite greatly exceeds in power the charge of 1.98 lb., which the Belgium government places as a limit on the best permissible explosives.

Similar experiments were made on Favier No. 1 extra, a powder having the following composition: Ammonium nitrate, 44 per cent.; trinitronapthalene, 6 per cent.; barium nitrate, 32 per cent.; trinitrotoluene, 18 per cent. It is safe to use 1.29 times as much of this powder in a shot as of dynamite No. 1.

TESTS WITH FAVIER NO. 1

Pounds of Powder: Cartridges	Weight	Pounds of Inert Dust: Calculated	Which Immunized	Failing to Immunize
2	0.49	2.65	2.20	
4	0.93	5.07	2.20	
6	1.38-1.43	6.72	6.61-2.20	
7	1.59	9.04	9.92	
8	1.70-2.01	10.36	8.81-6.61-5.29	2.20-4.41-6.61

In the two tests made with charges of 1.42 and 1.43 lb. and an "external tamping" of 6.61 lb. of boiler ash, which contained 18 per cent. of coal, dust was ignited. When the 'bourrage extérieur" was reduced to 6.61 lb. and the charge was 1.95 lb. of Favier No. 1 extra, the coal dust was fired. The same result followed when the outside tamping was reduced to 4.41 lb. and the charge was only 1.84 lb., but when the charge was increased to 2.01 lb., 8.81 lb. of inert dust prevented ignition.

The protection against the ignition of gas has not yet been tested as thoroughly as might be wished. A cartridge of 0.22 lb. of dynamite No. 1 or even half as much will fire methane. A single test was made with a charge of 0.88 lb. of dynamite and with 5 times as much inert matter to absorb the heat. Though the mixture of gas in which the charge was fired was at the maximum explosibility, it did not ignite the gas.

*Inspector-General of Mines, Belgium.
†Engineer of Mining Corps, attached to Department of Mining Accidents and Firedamp.
*75 per cent. nitroglycerin; 25 per cent. absorbent.

Who's Who—in Coal Mining

Devoted to Brief Sketches of Prominent Men, Their Work and Ideas

In the management of a great industrial corporation, it frequently occurs that more can be gained through congeniality than by the mere display of authority. In addition to abundant tact and diplomacy, the coal manager must possess iron nerve and indomitable resolution. It is one position in life where the man to be a success must be born for the job.

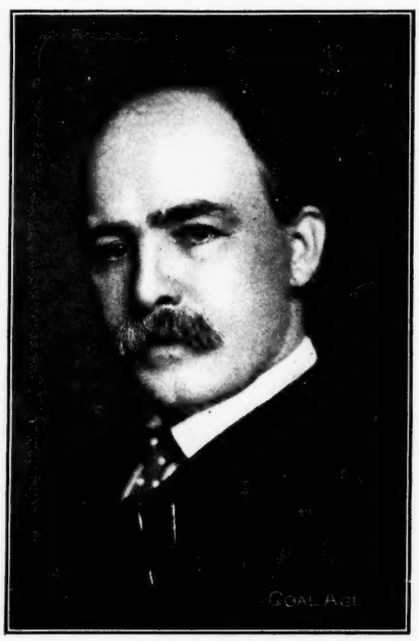
The highest official in the coal department of the Delaware, Lackawanna & Western R.R. Co. is R. A. Phillips, and no coal manager in the anthracite field has attained the top of the ladder through the exercise of greater persistence or more continuous effort. Having filled practically every position from the bottom up, few coal men are better qualified to administer the duties of such a high office. The rough road he had to travel has provided him with a deep knowledge of men, and implanted in him a sincere sympathy for the toiler.

In the district where he is best known, hundreds of miners and laborers point to Col. Phillips as their personal friend, and it is often remarked how well he preserves this close alliance with his employees and at the same time does not permit such intimacy to interfere in the reasonable discipline and proper discharge of his official duties.

Col. Phillips was born in Belleview, Scranton, Penn., Dec. 11, 1863. He was the son of Thomas J. and Anna (Jenkins) Phillips. His father was a native of Wales and when he came to Carbondale, Penn., in 1848, he was an accomplished and practical miner. Some time later, the elder Phillips was made foreman of the Jersey and Avondale mines of the Delaware & Lackawanna Co. at Plymouth, where "R. A.," the fourth son of the family, was reared.

His early education was obtained in the schools of that borough, but at the age of twelve, he was forced to abandon his studies and take up work in the Jersey mine at Plymouth. His first job was that of "breaker boy" and he worked diligently in this humble position, receiving a practical knowledge of mining from instruction rendered by his father after the day's work was done.

He advanced from one position to another until he became connected with the engineering corps of the company at the age of seventeen. In this work he received a valuable theoretical training which fitted him for the more responsible positions he was to fill. On leaving the surveying corps he was appointed assistant inside foreman, and in this position manifested his worth and ability to such an extent that before very long, he was given the responsible work of assistant inside general superintendent. From this position it was only a step forward to the office of district superintendent in which capacity he served for a number of years.



R. A. PHILLIPS

His efficient administration of the mines under his charge attracted the attention of the higher officials of the D. L. & W. Co., so that when a man was wanted to fill the job of general superintendent of all the Lackawanna collieries, R. A. Phillips was selected as the one person best fitted to fill the vacancy.

This important advancement placed him in direct charge of 15,000 men and it was in the control of this great army of toilers that he demonstrated the value that results from an official maintaining intimate relations with his miners. The one sure way to weather the periodic crises that are certain to occur in the business life of every great industrial corporation, is to have the perfect confidence of each subordinate and every employee.

A high percentage of the D. L. & W. men are natives of this country, and are above the average miner in intelligence, having come from stock that emigrated from Great Britain and northern Europe. Col. Phillips and other officials of the Lackawanna company have done everything in their power to better the living conditions and safeguard the lives of their employees, so that in return for the seed that has been sown, they have always reaped loyalty of a high order.

Any person having a proposition designed to render employment in coal mines safer, can always find an attentive listener in Col. Phillips. It has ever been his policy to lead rather than to follow, and if there is anything in the way of a new improvement created to better coal-mining practice, and the Lackawanna company has not adopted the new device, the apparatus in question must be hidden beyond all human power to unearth and investigate it.

The high standing of "R. A." in the mining world has been attested many times by the positions he has been called upon to fill outside his regular work. For three years he was a member of the Board of Examiners charged with passing upon the qualifications of applicants for mine-foremen certificates. For five years he served on the Inspector's Examining Board. Recently he was called upon to fill the most important position that comes to the lot of a coal manager, when as a representative of the anthracite companies, he was selected as one of the spokesmen for the hard-coal operators in the negotiations with the United Mine Workers of America.

Col. Phillips also was appointed a member of the subcommittee which deliberated for days over an agreement designed to bring peace in the anthracite field. It was remarked by one of his associates that in filling this difficult position, he was loyal to his cause, considerate of the men whose interests were at stake, and ready to concede anything that would benefit the miners and at the same time not jeopardize the reasonable success and assured future of the hard-coal industry.

Col. Phillips is a man of marked public spirit. He aided in the organization of the Keystone Bank at Scranton in 1904 and at the first meeting of the stockholders, was elected president, which position he still holds. He is a Mason of high rank and has attained to the 32d degree Scottish Rite.

Col. Phillips, when called to administer justice, never looks to see who is in the scales before he strikes the balance. His character is indicated by his belief that "friendship depends on reciprocity and esteem, and that the only way to have a friend is to be one."

Issued Weekly by the
Hill Publishing Company
JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.
505 Pearl Street, New York.

Monadnock Bldg., Chicago.
6 Bouverie Street, London, E. C.
Unter den Linden 71—Berlin, N. W. 7.

FLOYD W. PARSONS, Editor.

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication.

Subscription price $3 per year in advance for 52 numbers to any post office in the United States or possessions, and Mexico. $4 to Canada. $5 to any other foreign country.

Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London office. Price 21 shillings.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday of week prior to date of issue.

Entered as second-class matter, October 14, 1911, at the post office at New York, New York, under the act of March 3, 1879.

Cable Address, "Coage," N. Y.

CIRCULATION STATEMENT

Of this issue of Coal Age, we will print 8250 copies. No copies will be sent free regularly. There will be no back numbers. The figures shown here each week represent live, net circulation.

This journal is interested solely in matters relating to the fuel industries, and is designed to be a medium for the free interchange of ideas, the detailed description of coal-mining practice, and the expression of independent thought calculated to benefit both operator and miner.

Contents

	Page
Foreword	211
Ideas and Suggestions:	
Producing Clean Coke	212
The Electrical Haul	212
Work and Wages	213
Spotless Coke Towns	214
A Horizontal Gas Proof Electric Bulb	214
Standard Fireproof Mine Stables. E. L. Cole	215
Did the Bignall Hill Mine Explode? James Ashworth	217
Further Notes on Coal Impurities. A. Bement	218
Mining a Thick Vertical Coal Seam. John W. Powell	220
The Terra del Fuego Coal Field. Henry W. Edwards	222
A Locked Cap Box for Mine Use	223
Current Coal Literature:	
The Dangers of Rolls	224
External Tamping of Shots	225
Who's Who—in Coal Mining.	
Sketch of R. A. Phillips	226
Editorials:	
What Happened at Bignall Hill	227
Mine Examinations	227
The Undesirable Bachelor	228
Colliery Notes	229
Discussion by Readers	230
Inquiries of General Interest	232
Examination Questions and Answers	233
Society Department:	
Unrest Arises from Social Reconstruction	234
A Prize for the Miner	235
Coal and Coke News	236
Coal Trade Reviews	240

COAL AGE

What Happened at Bignall Hill

We print today James Ashworth's views on the Bignall Hill catastrophe. His ideas are always entertaining and original, because his mind does not follow the most obvious routes, and in this case, we are by no means sure that his conclusions are not just. Yet it would seem that those who saw the burned bodies after the disaster would be more competent to judge than those who were not present.

It must be remembered that the men who were burned were only about 400 ft. from the place where the gob fire was supposed to be located, and that at the back of the suggested location of the fire there was a large mined-out area from which a bed of coal 23 ft. thick had been recently removed. It is also known that this floor had been "weighting."

It is not, therefore, at all impossible that heated gases were forcibly expelled from the front of the fire by a sudden fall of the roof, and that these gases were of a nature rightly termed "afterdamp."

We do not need to refer to the experiments of W. A. Bone, as suggested by Mr. Ashworth, because the combustion of methane without flame was previously discovered by Harold B. Dixon. In fact, methane is slow to ignite, and doubtless under favoring conditions is prone to burn flamelessly, especially when the air in which it is found is impure. But why do we have to assume the action of methane in this case? A gob fire will furnish all the necessary heat without any interaction, flameless or otherwise, between external gases.

The concluding paragraph of the article is also interesting and provocative of thought, as Mr. Ashworth's writings are apt to be. It would seem likely that there is in many coals enough oxygen to make it possible for them to burn internally with sufficient energy (when once glowing or incandescent) to maintain a fierce heat, provided that they are not closely surrounded by an atmosphere by which that heat can be convected from their glowing surfaces. The experiment, if not already made, would be well worth trying. The assumption that some air invariably will reach a mine fire has usually been held to explain why combustion when once well started cannot even be drowned out.

Moreover we must not forget that in the coking of coal, the air is almost entirely shut off and during the transformation of the highly organic fuel to the more simple carbon an immense amount of heat is created. It is for this reason that coal at great depths may be transformed into coke despite the complete exclusion of atmospheric air.

While finding Mr. Ashworth's remarks relative to the possibility of internal combustion without the aid of a circumambient atmosphere interesting and plausible, we cannot agree with him that a *newly-started* gob fire cannot be extinguished by the shutting off of the air supply, nor can we hold that the complete arrest of all ventilation into the mined-out area will fail to prevent the initiation of spontaneous combustion.

Mine Examinations

A letter recently received from a mining engineer of long experience draws the attention of COAL AGE to the character of some questions asked at an examination of mine foremen in one of the states. The questions submitted were, perhaps, intended to be technical. At least, one would naturally be led to suppose from the reading of the questions that their author thought he knew a little of theoretical mining. He did know *just a little,* but that little made him a dangerous member of the examining board. It brings to mind an old maxim, *"A little knowledge is a dangerous thing."*

The complaint often comes to us from candidates who have been before an examining board, that "none of the board could answer their own questions"; and there are probably good reasons for the complaint, in the majority of cases. We recall an instance that occurred a short time ago at a mine inspector's examina-

tion. The incident was told to me by a candidate who was present at the time. The questions had been written on the board and one of the candidates asked for an explanation of one of them by the Board, stating the point on which he requested to be informed as to the meaning intended in the question. The explanation given in reply to the candidate's inquiry showed that the question involved an impossibility in practice, and it was thereupon hastily wiped from the board.

We have been asked many times by members of the examining boards to prepare for them a proper set of questions, to be used in a coming examination, but in every case, save one, We have turned a deaf ear to the appeal. Examining boards should, in all cases, draft their own questions; and they should never ask a question that they could not answer themselves, in a similar examination in which *they* were the candidates. COAL AGE urges all members of examining boards to regard themselves as in the candidate's place, and ask only such questions as are plain and practical. In preparing the questions to be asked, consider what qualifications are necessary to make intelligent and competent mine foremen and firebosses and make the questions to fit these requirements.

Some say, "make the examination practical" and many examining boards, acting on this suggestion, which seems to be good, have asked only such questions as can be answered by men of practical training but having no theoretical knowledge. In doing this, they have completely eliminated all theory and principle from the examination. This is not right. It is just as important for successful men of practice to understand the theory and principles of mining, today, as it is that mining engineers, who are versed in these, should have, besides, a thorough practical knowledge and experience in the work of mining.

COAL AGE, therefore, again, urges upon all examining boards the importance of combining theoretical questions and questions involving the important principles of mining, with those questions that pertain to practical work only. Both kinds of questions are important in the written examination of all mine officials. No other examination is competent.

It is important in the examination of this class of men, many if not the most of whom have struggled hard to obtain the book knowledge they possess, to place them under conditions to which they are accustomed. It is not a school examination of students who have been trained to memorize what they learn; but the purpose in these examinations is to ascertain the capability and the capacity of the candidate to act intelligently in the position which he desires to fill. It is not a question of "How much does this man remember of what mining books teach"; but, rather, "Does this man understand how to use mining books, in order to find in them the knowledge he requires." Give him his textbooks that he is accustomed to use, and require him to show, in the examination, that he understands how to use those books in solving problems of daily practice.

Part of the written examination should be devoted to questions involving principles of mining that the candidate should be able to answer without the aid of textbooks; and in this section of the examination no books should be allowed. The oral examination should be designed to test the candidate's ability to think and act quickly, especially at a time of emergency. The questions asked should be clear and call for a prompt and decisive answer. At the present time, there is one state, Montana, that provides, in its mine law, for the use of textbooks in the examination of mine officials. The law has given thus far commendable results.

There are three essentials to be determined in the examination of candidates for mining positions; namely, character, experience and capability or capacity. The capability, or capacity, of a candidate is to be determined by ascertaining the candidate's theoretical and practical knowledge.

The Undesirable Bachelor

One good feature of the mining population is to be found in the proneness of all young men to get married. We wish we could add without cavil the words "and settle down."

Unfortunately, however, to a large part of our foreign mining population, bachelorhood is compulsory and the freedom of the celibate and his irresponsible disregard for the conventions of society, is the cause of no little folly on the part of his married compatriots, for his bad example invites imitation.

It would be well if all the workers, especially foreigners, around coal mines were married, as was suggested by F. A. Boag, in an early issue of this journal. He urged that preference be shown to married men at the port of entry, and lamented the fact that the immigration officials did not favor the advent of unmarried women for fear that a few might swell the underworld of our large cities.

Speaking at Honolulu lately, July 30, Charles W. Elliott, president emeritus of Harvard University, called for equal immigration of men and women, not for justice sake, but for the national advantage. He remarked that "If men immigrate, the women of their race should also come to our shores." He advocated laws which would prevent the preponderance of more than 5 per cent. of men over women entering the country. There are few things more desirable than such matrimony.

Only married men will make this country their settled home, and the savings of our foreign population should not be taken year by year across the ocean to be spent in foreign countries. Marriage is the great stimulant toward sobriety and thrift. Even the Southern negro can best be handled by giving him a purpose in life which will absorb all his earnings as fast as made.

We remember a discussion on the negro, in which one man employing that type of labor declared it utterly shiftless and lazy. Another man took the opposite stand. He desired to employ no one but negroes, and he explained his method of handling them. He preached constantly to them that he had the best dressed negroes in that whole valley. They all besported themselves after working hours in clothes which would have done credit to a city dude. Their wives were clad accordingly, and they worked energetically to maintain the style and reputation of their camp.

Dress is not the most desirable stimulant to labor. An attempt to get a good home or a lot or a little farm would be more commendable, but no matter what stimulant is provided, so long as it does not occupy a bottle, it is good and the only thing which will promote effort and steadiness of character. What incentive to energy has the unmarried miner in a colliery village, and what chance for marriage has a foreigner in a town where there is perhaps not a single unmarried woman of like race to himself?

Colliery Notes and Comments

Practical hints gathered here and there, and condensed to suit the busy reader

Most gases having marked toxicity can be detected by the sense of smell. Such mine gases are hydrogen sulphide and the peroxide of nitrogen. But carbon monoxide is not thus detectible.

While the necessary quantity of exhaust steam requisite to lay mine dust has never been definitely determined, it is estimated to consume ¾ hp. per 1000 cu.ft. of air supplied per minute, regardless of the size of the mine.

In the Mt. Baker district of the state of Washington, anthracite coal exists in near proximity to metamorphic sedimentary rocks, slates and schists. It is low in volatile matter, doubtless due to the action of the heat which produced the schist and slate.

Have all airways large, and square or round in section, or as near these forms as practicable. These offer the least rubbing surface and therefore less resistance per unit of area. Also do not attempt to work more than you can ventilate properly. Keep in mind the power at your disposal.

Coal dust is not explosive unless set in motion, as, for instance, by a runaway trip, a blownout shot or a very heavy fall of roof. When an explosion takes place it disturbs all the dust on the roof, floor and sides, which ignites, burning and devastating all before it. It would follow up a runaway trip much as if it were gunpowder instead of coal dust.

In mines with poor roof the puncher type of coal-cutting machine gives good results as it can be used where timbering is close up to the face. One puncher machine is estimated as being able to do the work of 16 miners with picks. They can be operated on an incline of 15 deg. and are also able to cut around sulphur balls and other hard substances in the coal.

In case of accident the lives of the entombed miners often depend upon the fan and its correct working. Fans should be located at least 50 ft. away from the mouth of the shaft, slope or drift, to which they should be connected by a tunnel at a sharp angle with the shaft. Balanced explosion doors are a great protection and two means of operating a fan are almost a necessity.

Nicholas Wood's formula to find the pressure, in pounds per square foot, producing ventilation is as follows:

$$\frac{(T-t)}{(460+T)} \times D \times 0.0766$$

Where T = temperature in the upcast shaft; t = temperature in the downcast shaft; D = the depth of the upcast shaft in feet; 0.0766 = the average weight, in pounds, of a cubic foot of air.

In the old days, what was known as the Scotch gauze lamp was in common use in the coal mines of Scotland. Its construction was simplicity itself. A large gauze cylinder, made to fit on an oil vessel, a screw lock, and for a handle an iron hook attached to the gauze, made up all the parts of this old-fashioned safety lamp. It could easily be tampered with and opened, while in the course of a shift it required to be trimmed three or four times. Small wonder that such a lamp fell into disuse. It was the direct cause of some serious explosions.

The latest type of Draeger rescue apparatus is so designed that the length of time which it may be worn is limited only by the physical endurance of the wearer. The principle of this new apparatus is the same as the older machine, except that when a cylinder is exhausted, a new one may be substituted without returning to the base of supplies. The time required for making the change is only 30 sec. and breathing would not be affected in any event for several minutes. While making the change self-acting valves automatically close, so that this may be done in the most poisonous of gases.

Boiler water is a matter of great importance in mining. If the feed water is highly charged with carbonate of lime the boiler is soon thickly encrusted, for as the temperature increases its solubility decreases. New boilers, fed with water charged with sulphates of iron, lime, magnesia and other subjects, can be destroyed in a few weeks, as these salts act chemically on the plate, "pitting it" and eating it away. It is well to thoroughly understand the dangers arising from the use of unsuitable feed water. It results in the wasting of heat or in damage to the shells of the boilers.

A new fuel supply has been discovered in Egypt within the last few years. This is the Sudd district, on the upper Nile, which comprises about 35,000 square miles of a vast morass overgrown with sudd. It was discovered by Herr Von Roth, a German chemist, that this sudd could be briquetted. The heating value of these briquettes is said to be nearly two-thirds that of coal and their density about four-fifths, while the cost of manufacture is low. The cost of British coal at Khartum is $12.50 per ton, and these briquettes can be placed on the market at about $3.75. The Sudanese government has undertaken the manufacture of this new fuel.

Success in longwall mining depends greatly upon the following points: (1) Keep all walls uniform, for if one is allowed to fall behind, there will be trouble with the ventilation. (2) Keep the line of face as even as possible; do not work zigzag, as this method is apt to result in closing the wall at the point, which is sure to be crushed, thus obstructing ventilation and increasing expense. (3) Do not advance any portion of the face further than a single cut, as this makes the coal harder to mine, and increases the amount of slack. (4) Keep all places well timbered, but, if possible, have no timber in the waste, as it prevents a proper roof subsidence and increases the cost of timbering. (5) Keep the packing on roadways well forward, and lay it tightly, or the weight will push it out into the road.

The Cunynghame-Cadman gas detector consists of a thin sheet of asbestos soaked in salt or bicarbonate of soda, viz., common baking powder with a small quantity of hydrochloric acid. When conducting the test the asbestos should be moved parallel into the flame until it is within about $\frac{1}{32}$ of an inch of crossing the wick, and at such a height (about $\frac{1}{16}$ in.) as to cause an orange fuzzy mantle to appear on the top of the wick. If the flame is placed in a gas mixture a distinct big yellow cap will be seen above the fuzzy mantle, and the length of such gas cap will be a measure of the quantity of gas present in the mixture. One per cent. of gas appears to give a yellow cap of about ½ in. Do not allow the asbestos to be cut away less than ¼ in. wide, or the metal carrier will absorb or radiate heat from the flame and interfere with the test.

Discussion by Readers

Comment, Criticism and Debate upon Previous Articles, and Letters from Practical Men

Mine Foreman versus Mine Inspector

In reading the comments and recommendations made by some of the mining men who attended the annual meeting of the Coal Mining Institute of America, held in Johnstown June 25, I could not help being impressed by the thought that as a mining man rises above the position of mine foreman he begins to make suggestions that if made to him by others, while he was holding the position of mine foreman, would have been resented.

One mine inspector is quoted as saying that the mine foreman is the key of the situation, both as to safety and efficiency. I wonder how sincere the man was who made that remark, and also whether he has forgotten the many hard knocks and bumps that he received in trying to safeguard the miner while he was still holding the position of mine foreman. The same speaker referred to the waste of mine timber. I wonder whether he meant that the mine foreman should economize by reducing the supply of props allowed the miner to keep himself safe, or whether he referred to the large quantity of timber that is lost every day in the drawing back of pillars. In either case we may ask if he never lost timber when in the position of mine foreman. From his own standpoint as a mine inspector, the suggestion of economizing in props seems ridiculous, as the mine inspector's duties should be devoted entirely to the protecting of the miner regardless of any expense that may be incurred in so doing.

When he speaks of maintaining the discipline throughout the coalfields, so that men will not be able to flit from one mine to another, I am not clear as to whether he refers to the miner or the mine foreman in this connection.

MINE FOREMAN.

Dunning, Ky.

We regret that our correspondent was not at hand at the Institute to defend himself and his co-workers. In justice to the speaker it should be said that he referred to the props piled up in the crosscuts and not used, which obstruct the air and are a sheer waste of timber. He also referred to those props that are left lying in the gob on drawing pillars.

His observations relative to the need of more discipline being enforced in the mines throughout the coal fields, had reference to the habit of some miners, of jumping about from one mine to another.

Proposed Ventilation System

Replying to the remarks of Mr. Ashworth, COAL AGE, Aug. 3, p. 161, who suggests that if an explosion occurred in No. 1 right or left, the gases generated would "poison the mine air throughout the mine," let us assume that an explosion has taken place at the face of No. 1 right; and that the force was terrific, tearing down all stoppings between that point and the shaft with a possibility of spreading into No. 2 right. The air coming down the downcast *D* is now short-circuited and passes through the first crosscut outside of No. 1 right entries and up the upcast *U*.

I have suggested previously that in this system there will be no necessity of reversing the fan, which has been set back from the shaft and provided with explosion doors, so that we may reasonably assume that it has not been put out of commission by the explosion. The airways, therefore, between the downcast and the upcast shafts, by way of the first crosscut, are clear of gas. This is the condition immediately following the explosion.

The men working in the entries on the right and inby of the point of explosion and who have not been injured by the force of the explosion, can escape through the manholes in the stoppings in the barrier pillar and reach the foot of the downcast or hoisting shaft by way of the main haulage road on the left. Notifying these men and providing for their escape, in every way possible, is the first consideration.

In attempting to recover the explosion district and rescue any who may have survived the blast, the first step is to increase the circulation in that district as far as practicable. In considering this matter more carefully, I find my original plan will, in most cases, be the safest one to adopt. That original plan differed from the one submitted to COAL AGE, only in providing a crosscut through the barrier pillar halfway between each pair of crossheadings. This will make two manholes, instead of one, available for the ventilation of the affected portion of the mine, as it may happen that more air will be needed than could be secured through the single manhole mentioned in my previous article.

It will be observed that the main feature of this proposition is to provide, if possible, an independent double-entry system on each side of a main barrier pillar, and to so arrange and equip the crosscuts or openings in this barrier, as to permit the escape of men who may have survived the explosion, and yet be so constructed as to resist the force of the blast. If this could be done, the destruction of *every stopping in the mine* by an explosion would not prevent the quick recovery of the mine, and the re-establishment of the circulation in a short period of time following the explosion; because by the arrangement of suitable emergency doors, it would be possible, after the explosion, to make one side of the mine the intake and the other the return. By the further arrangement of the crosscuts in every alternate chain pillar, it would be possible to recover in succession the separate sections of the mine by sending the air current down one pair of entries and through the last crosscut in the chain pillar, returning it through the other pair of entries.

Coal Mine Accidents

I have been much interested in reading the article, "Accidents in Bituminous Mines," by Frederick L. Hoffman, COAL AGE, July 27, page 119. One cannot examine the figures Mr. Hoffman gives in his table, without realizing the fearful risks that are run every day by miners. We must, of course, recognize the fact that workers in all dangerous callings become accustomed to the dangers with which they are surrounded, and assume naturally many risks that are severely condemned by laymen. The risks the worker is willing to run, however, because of his familiarity with danger, are none the less dangerous; and the responsibility for the accidents that so often follow the condemned practices of miners, rests on the miner alone. There is, besides these, another class of accidents, the responsibility for which rests on the boss or the management. They are due to poor equipment, defective material, lack of supervision and discipline, and other like causes for which it is the duty of the management to make provision.

Mr. Hoffman's figures, in his first table, show there were 2730 fatal accidents in the bituminous mines of Pennsylvania, during the five-year period, 1906-1910, or a yearly average of 546 fatal accidents; and 5395 nonfatal accidents in the mines, or a yearly average of 1079 cases of serious injury to the workmen during the same period. The year, 1907, was the most disastrous year

in this period, with a total of 766 fatal and 1144 nonfatal accidents.

It is unnecessary to enumerate these results, which are clearly shown in the tables. A glance will show that the largest number of accidents, both fatal and nonfatal, inside the mines is due to the fall of roof and coal. Table 3 shows that out of the 2730 fatal accidents inside the mines, during the period named, 1471 of these were due to falls of roof and coal; and table 5 shows that out of the 5395 nonfatal accidents, in the same period, 2948 were due to the same cause. This is a terrible showing; but we become so used to seeing such tables published, that we fail to realize how serious the matter is in its results.

Could we see, in a single moment, a line of 2730 men and boys, 3 ft. apart, reaching over a mile and a half in length, and following these 5395 injured and crippled, extending the line to 4½ miles in length; and then close our eyes and imagine to ourselves the misery and desolation that must follow in their wake; would we not open our eyes in astonishment? The yearly death rate, as shown in Table 1, is so nearly uniform that we can tell, from year to year, very closely the number of men that will be killed and injured in the year to come, before the time is complete.

Safeguards in Mining: Intelligence, Watchfulness and Obedience

If we watch the men gathered at the top of the shaft, in the morning, prepared to go down into the bowels of the earth, we observe a goodly number of them are the picture of intelligence; others show in their faces that they will never rise above the loading of coal. But the question that comes to the mind is, "Will the intelligence of the few safeguard the many?" What official has not gone into the working places of those he considered the most experienced miners in his employ, and found these men working under roof that was not safe for a man to walk under. When questioned, the reason given was that the worker "wanted to load another car before setting timber," considering his day's output of more importance than his safety.

It is no wonder that serious accidents happen, in mining, when experienced miners will thus disregard their own safety and ignore their better judgment, in the same manner as an evil doer silences his conscience. When a miner fails to comply with the mine regulations and instructions from his foreman, he takes his own life in his hands and assumes a responsibility for the lives of others. Good laws and good mine regulations are helpless, under these conditions, to secure the safety of the mine and that of the workers. *Eternal vigilance and strict obedience are the most essential requirements in the prevention of mine accidents today.*

Accidents are not always preventable. Every precaution taken by a miner working under a treacherous roof, will not always prevent an accidental fall of roof, at a time when the miner least expects it. Most of this class of accidents, however, are due to carelessness and delay, on the part of the miner, in setting timber. Many miners think the foreman or boss is imposing an unnecessary task when he asks a miner to stop his loading and set a post.

The Bituminous (Penn.) Mine Law

It is not my purpose to criticise unduly the mining laws, but I would like to draw attention to the ample provision made in the bituminous law of Pennsylvania, requiring the inspection of a gaseous mine by certificated firebosses, who are required to visit every working place not more than three hours before the men begin work, each day. In a nongaseous mine the foreman or his assistant is required by law to visit every working place where men are or should be at work, every day; but the assistant foreman need not be a certificated man. My experience as assistant mine foreman in nongaseous mines, is that the company is generally anxious to comply with all the requirements of the mine law; and if any assistant neglects his duty his services are not longer required. But it seems to me that the law might have made the same requirements as to certificated assistant foremen in nongaseous mines as in gaseous mines.

An Old Miner.

Scalp Level, Penn.

Our correspondent has probably based his closing remarks, relating to certificated assistant mine foremen, on the old bituminous mine law of Pennsylvania, which reads (Article 6, Section 7):

> . . . . . In all mines where firedamp is generated the said assistant or assistants shall possess a certificate of competency as mine foreman or fireboss.

The new, revised, bituminous law of Pennsylvania (1911), although not as clear as might be desired, makes provision for two grades of mine foremen certificates (Article 24, Section 4), as follows:

> . . . . . Certificates of first grade shall be granted to persons who have given to the Board of Examiners satisfactory evidence of their ability to perform the duties of mine foremen in *gaseous* mines, and who shall have received an average of at least 80 per cent. in the examination. Certificates of second grade shall be granted to persons who have given to the Board of Examiners satisfactory evidence of their ability to perform the duties of mine foremen in *nongaseous* mines, and who shall have received an average of at least 80 per cent. in the examination.

Following this, the provision for the certification of *assistant* mine foremen is not as clear. It reads:

> Certificates of qualification as assistant mine foremen shall be granted to persons who have given to the Board of Examiners satisfactory evidence of their ability to perform the duties of assistant mine foremen in *gaseous* mines, and who shall have received an average of at least 70 per cent. in the examination.

Following this, the law states,

> All applicants for certificates as mine foremen and assistant mine foremen in *gaseous* mines must also undergo an oral examination in the presence of explosive gas.

A clause of Article 4, Section 1, reads as follows:

> . . . . . If the mine is generating explosive gas in quantities sufficient to be detected by an approved safety lamp, the mine foreman's assistants must possess first-grade assistant mine foremen's certificates.

The reading of this clause leaves no room to doubt, what is probably true, that the framers of the law intended to provide two grades of certificates, a first-grade certificate applying to *gaseous* mines and a second-grade certificate applying to *nongaseous* mines.

As far as our knowledge goes, all the mines of any importance, in the bituminous coal fields of Pennsylvania, employing assistant mine foreman, use only men who have the first-grade assistant-mine foreman's certificate required by law, in mines generating gas, or the second-grade certificate in mines having no gas.

Entry "Sights"

Referring to the question of the best location for placing sights when driving an entry, and the statement that "Most entry drivers prefer the sight line located about a foot from the off rib of the entry," Coal Age, July 27, p. 127, permit me to say that I believe such a location is proper in pitching or chute places, where the line would then be over the manway and readily accessible not only for the foreman or miner, in lining up the place, but also for the engineer, who may be called on to extend the line farther up the breast.

In a flat seam or roadway, however, I believe that the line should be set at about 8 ft. from either rib; assuming the places are driven 16 ft. wide, the sight line would then be in the center of the entry. My reasons for choosing this position of sight line are: First, if the seam is dirty, the refuse must be gobbed on the rib, and 8 ft. will allow the sight line to clear the gob or building easily. Second, if the sights are any distance from the face, the brattice extended from the inside crosscut toward the face is liable to interfere with the line of sight, unless it is kept at a sufficient distance from the rib. In this case, allowing 5 or 6 ft. for the width of the brattice, a distance of 8 ft. will give a good clearance for the sight line.

E. C. Lee,

Engineering Dept., Lehigh Valley Coal Co.
Wilkes-Barre, Penn.

Inquiries of General Interest

All Questions Must be Accompanied by Name and Address—Not for Publication

A Mine Fan

We have at our mine a push fan or blower. I think something is wrong with the fan, as it takes in air in one-half and throws out some of the air, again, in the other half, on each side of the fan. Can you tell me what is the matter or what can be done to remedy this difficulty?

JAMES EWING,
Mine Foreman.

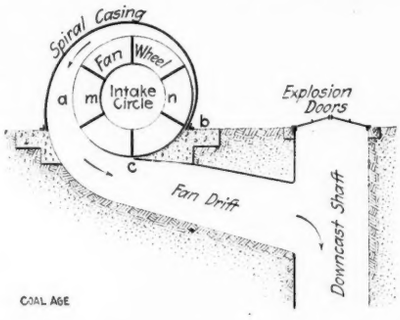
Force, Elk County, Penn.

When a centrifugal mine fan does not draw the air uniformly over the entire intake area, the reason is generally found in the defective design of the casing, or the trouble arises from some obstruction in some portion of the air conduit surrounding the fan. It sometimes happens that the fan wheel is not properly centered in the spiral casing.

I recall, at one time in my own experience, seeing a fan that acted in the manner described by our correspondent. The reason in that particular case was due to the fact that the fan casing was tangent to the fan wheel at the side opposite to the point of discharge. The result of this construction was that while the air in one-half of the fan traveled around the periphery inside the casing, in the same direction in which the fan blades revolved; in the other half the air was forced to travel in a direction opposed to the motion of the blades. As a consequence, the air on that side was baffled, which destroyed the action in that half of the fan.

In a well designed fan the air cuts off at a point marked *c*, in the accompanying figure, on the discharge side of the fan. A short distance beyond this point in the periphery, the casing begins to expand in a spiral in such a manner as to produce a uniform velocity of the air flowing about the fan. This air must flow in the same direction as the fan is revolving, throughout the entire circle of the fan.

The accompanying figure shows in outline the proper form of spiral casing surrounding the fan. The fan wheel, *a*, *b*, *c*, revolves in the direction shown by the arrows. The central, or intake opening, *m n*, is of such an area as to accommodate the required volume of air at a velocity of from 1200 to 1500 ft. per min. The throat of the fan, or the cylindrical surface, corresponding to the intake circle *m n*, must have such an area as to accommodate the given air volume at a velocity varying from 1000 to 1200 ft. per min. This determines the width of the fan. The depth of the fan blades added to the radius of the inner circle *m n* of the fan, determines the radius of the outer circle *a b c* of the fan wheel.



CROSS-SECTION OF A BLOWING FAN SHOWING CONNECTION WITH DOWNCAST SHAFT

This calculation, determining what is called the diameter of the fan, is the most important of the fan calculations. It depends on a number of factors relating to the density of the air and the potential of the airway or its resisting power. The calculation, in this respect, is too complicated to be given here; but it may be stated that the radial length of the fan blades of any centrifugal fan, or the radial distance beween the inner and outer fan circles, increases with the water gage against which the fan must operate.

As far as our knowledge goes, the only centrifugal fan designed on these principles is that manufactured by S. B. Stine, Osceola Mills, Penn., and known as the Beard-Stine fan.

It will be observed in the figure that the spiral casing from *c* to *b* is the arc of a circle concentric with the fan circle or circumference of the fan wheel. From the point *b* the spiral casing expands uniformly around the fan wheel in the direction in which the latter revolves. This gives a uniform velocity of the air flowing about the circumference of the wheel.

Weight Engine Will Lift

At the examination for first-class certificates, in British Columbia, October, 1911, the following question, in machinery paper, was submitted: "What weight will a single engine of the following dimensions lift: diameter of cylinder, 12 inches; length of stroke, 18 inches; average steam pressure, 50 lb. per sq.in.; geared 4 to 1; diameter of drum, 6 ft.

First Solution—The total cylinder pressure is $0.7854 \times 12^2 \times 50 = 5654.9$ lb. The weight lifted, disregarding friction, is

$$\frac{5654.9 \times 18 \times 4}{6 \times 12} = 5654.9 \text{ lb.}$$

Second Solution—As before, the total cylinder pressure is $0.7854 \times 12^2 \times 50 = 5654.9$ lb. The circumference of the winding drum is $3.1416 \times 6 \times 12 = 226.2$ in. The weight this engine will lift, disregarding friction, is then

$$\frac{5654.9 \times 18 \times 2 \times 4}{226.2} = 3600 \text{ lb.}$$

It will be noted that, in the first solution, we multiply the total cylinder pressure by the length of stroke and divide by the diameter of the drum; while in the second solution, we multiply the same total cylinder pressure by twice the length of stroke and divide by the circumference of the drum. Please explain the difference in these two answers.

J. W. POWELL.

Coalmont, B. C., Canada.

An engine will always lift more than it will hoist. There are two reasons for this: First, when the engine starts to lift the full cylinder pressure is effective to lift the load; but when the engine is running and cutting off steam at, say two-thirds stroke or less, the mean effective steam pressure, in the cylinder, is less than the initial cylinder pressure; because the engine finishes its stroke by virtue of the expansion of the steam; and the pressure in the cylinder falls from the moment the steam is cut off, to the end of the stroke. The mean effective pressure, in general engine practice, may be taken roughly as three-fourths of the initial cylinder pressure. In the two solutions given by our correspondent, however, the same cylinder pressure (50 lb. per sq.in.) is used in each calculation.

In the first solution, the lifting power of the engine would be correctly calculated if the pressure stated were the initial cylinder pressure. The second solution does not calculate the lifting power of the engine, but the hoisting power. The lifting power of an engine is based on the *principle of moments*, the moment of the steam pressure in the cylinder being equal to the moment of the load lifted. The hoisting power of an engine is always based on the *equality of work*, the work of the steam in the cylinder being equal to the work performed in hoisting the load, allowing for losses in the engine.

Examination Questions

Selected from State Examinations, or Suggested by Correspondents

Examination Questions

Surveying, Leveling

Ques.—For what is a leveling instrument used?

Ans.—The level, in surveying, is used to determine the difference in height or elevation between two given points.

Ques.—If the rod reading on station 1 is 5 ft. while on station 2 it is ten feet, what is the relative position of station 2 and station 1, in respect to vertical height?

Ans.—The elevation of station 2 is 5 ft. lower than station 1.

Ques.—(a) If point 2 is ten feet higher and 1000 ft. distant, level measurement, from point 1, what would be the percentage of a uniform grade between these two points? (b) What is the angle of inclination corresponding to this grade?

Ans.—(a) The grade from sta. 1 to sta. 2, in this case, rises 10 ft. in 1000 ft., or 1 ft. in 100 ft. This is a 1-percent. grade. (b) The angle of inclination corresponding to this grade is the angle whose tangent is 0.1. This angle is 0° 34′ +.

Ques.—If the angle of inclination between two points is 30 deg. and the horizontal distance between these points is 200 ft., what is the corresponding distance measured on the pitch, and what is the vertical height between the points?

Ans.—The distance between these points, measured on the pitch, is

$$\frac{200}{\cos 30^\circ} = \frac{200}{0.866} = 230.94\ ft.$$

The vertical height between the same points is

$$200 \times \tan 30^\circ = 200 \times 0.57735 = 115.47 \text{ ft.}$$

Since the sign of 30 deg. is ½, these results are easily proven by observing that the vertical height is just one-half of the pitch distance.

Compass Surveying

Ques.—How can you make certain that your compass gives a correct reading, on any course?

Ans.—By backsighting on the same course when the compass is set up on the other end of the course. If the reading of the needle on the backsight corresponds to the foresight reading it may be assumed that both of these readings are approximately correct.

Ques.—An entry is driven N 40° E, and the rooms are turned N 10° W; the pillars being 30 ft. wide and the rooms 24 ft. wide, what is the distance between the room centers, measured on the entry?

Ans.—Since the bearings of the entry and rooms lie in quadrants on opposite sides of the meridian, the angle the rooms make with the entry is found by adding these bearings together; thus, 10 + 40 = 50 deg. The total distance measured across the rooms and pillars is 30 + 24 =54 ft. The corresponding distance between room centers, measured on the entry, is then

$$\frac{54}{\sin 50^\circ} = \frac{54}{0.766} = 70.5\ ft.$$

Lifting versus Hoisting Power of Engine

Ques.—What is the difference between the lifting power and the hoisting power of a steam engine, and how is each calculated?

Ans.—The lifting power of an engine is expressed by the load the engine will lift under full head of steam. This load is always greater than what the engine will hoist. The lifting power of an engine is calculated by multiplying the total cylinder pressure (lb. per sq.in.) by the length of the stroke (in.), and that product by the ratio of gearing; and dividing the final product by the diameter of the winding drum (in.). The quotient obtained will be the load, in pounds, that the engine will *lift.*

The hoisting power of an engine is calculated by multiplying the total cylinder pressure (lb. per sq.in.), as before, by twice the length of the stroke (in.), which is the piston travel per revolution, and that product by the ratio of gearing, as before; and dividing the final product by the circumference of the winding drum (in.), which is the distance the load is hoisted per revolution. The quotient obtained is the load the engine will *hoist.*

Ventilation Problems

Ques.—An airway is 5000 ft. long, size, 5x10 ft., making the area 50 sq.ft.; and the quantity of air in circulation is 50,000 cu.ft. per min. What will be the water-gage reading if the air course is also 5000 ft. long?

Ans.—In this case, the total length of intake- and return-air courses is 10,000 ft. If, as may be assumed, the air is to travel this entire length of airway, in a single current, at a velocity of 50,000 ÷ 50 = 1000 ft. per min.; the perimeter of the airway being 2 (5 + 10) = 30 ft., the water gage required to produce this circulation would be

$$\frac{0.00000002 \times 10{,}000 \times 30 \times 1000^2}{50} : 5.2$$

$$= 23 + in.$$

This, of course, is an impossible proposition; in other words, it would be practically impossible to maintain a velocity of 1000 ft. per min. in an airway 10,000 ft. long.

Reducing Danger to a Minimum in a Dry and Dusty Mine Generating Gas

Ques.—If you were in charge of a mine which was naturally dry and dusty and also liberated explosive gases, state in general how you would reduce the dangers of same to a minimum and provide the greatest safety to the workmen under your charge?

Ans.—The first consideration, in the operation of such a mine is the adoption and strict enforcement of rules and regulations that experience teaches are necessary to maintain safe conditions in the mine. The ventilation should be so arranged as to make the haulage roads the main intake air courses, for each section of the mine, which will necessitate the adoption of the exhaust systetm of ventilation.

A close study of the conditions existing in each section of the mine, should be made, in order to determine the proper distribution of the air and other requirements. No mixed lights should be allowed in any one section of the mine; and fully equipped and guarded lamp stations should be maintained at the entrance to those sections requiring the use of safety lamps. All lamps must be owned by the company and cared for by competent and regularly appointed lampmen. The lamps should be of an approved type, inspected and tested at regular intervals.

No explosives, oil or powder of any kind, should be stored in the mine; and only such amounts of powder should be taken into the mine, each day, as will be required for each man's use. No powder other than those known as "permissible powders" should be used. No shots should be fired, except by permission, and at the time specified by the mine foreman and after the place and those adjoining have been examined by the fireboss. All shots should be examined and passed by competent shotfirers before they can be fired. All places, roads and airways should be regularly cleaned and sprinkled as conditions may require.

Sociological Department

For the Betterment of Living Conditions in Mining Communities

The Action of Low Voltage Current

The following excerpt is taken from Dr. Chas. A. Lauffer's book on "Electrical Injuries":

"When the voltage is much in excess of 15,000, a man seldom makes contact with the conductor, for the voltage jumps over to his fingers, flexing them and making it impossible for him to make a contact, unless he is thrown upon the wire. It takes a perceptible interval of time for a man to approach the conductor, but the discharge is instantaneous.

The flexor muscles are so much stronger than the extensors, that the man is rolled up and violently precipitated. The discharge which bridges the interval between the circuit and its victim may cause extensive surface burns, and in proportion to the extent to which it confines itself to the surface, there is diminished liability of serious electrical shock.

Muscles Which Open Hand Stronger Than Those Closing It.

"The man approaching the high voltage conductor sinks as if shot when the discharge hits him. Although the conditions may be such that he will receive a heavy current, the discharge may, more fortunately carry with it only a small current, yet enough to flex his arm and leg muscles violently, and cause him to fall 'all over himself.'

"Such precipitation assists in extricating him from what might be a dangerous contact. In case of low voltage, if the hand grasps the conductor, the excessive electrical stimulation of his muscles causes his grip to tighten. His fingers flex tetanically. If unassisted, he is often unable to release his hold."

Unrest Arises from Social Reconstruction

By Charles L. Fay*

The coal operator or workman who declares that, as a rule, his fellowmen are solely dominated by the vicious motive of self-gain and are completely indifferent to the rights and comforts of others is, in the larger sense, wrong. He is either the victim of a circumscribed opportunity for investigation, or else suffering from the resentment which a little mind sustains after the apparent defeat of some personal ambition, or perhaps he is bound by the chains of prejudice.

Social Unrest is Not Due Mainly to Class Antagonism

The social unrest of today is largely the outcome of our institutions, which were modeled by and planned to fill the needs of former generations. Effective as they were in meeting the needs of earlier days, they did not clearly anticipate the future or prepare society for the changed conditions of the present period. The growing unrest became more apparent as society tried to adjust itself to the new basis.

What, may be asked, was the change which replaced the content of the past by the unrest of today? As soon as great industries began to develop such as continental railroading, coal and metal mining, textile manufacturing, steel making, electrical manufacturing, power generation, etc., young men left the farms, lured to towns by opportunities for money-making and by the exciting influences of industrial development.

Thousands of immigrants from southeastern Europe came to our shores and found their way into these whirlpools of activity, and our towns became great centers of population throbbing with commercial interest.

There was a constantly rising temperature of human desire. Society had established new centers of industry, but these were not also centers of community life. The new arrivals came to work together, but otherwise did not recognize any other unit purpose.

Public Schools and Their Attitude to New Conditions

Our public-school system had held high its ideals of a classical education. It was in the business of preparing boys to become presidents, physicians, lawyers, preachers, and to youth, all signboards indicating the road to future success were plainly marked ". . . . . miles through the classical course to professional life and preferment." Parents were imbued with the idea, and teachers in common schools counted it sacrilege to do other than advise the prescribed route.

The time came when the "boys" broke line and headed pellmell for the short cut, through the byway of experience, to the new vocations. Many parents saw their embryonic presidents, lawyers, doctors and preachers, disregarding all ideals and traditions, drawn by the centripetal force of the new industries into the furnace, which was to create new social worlds.

But the school system maintained its dignity and historic polity *in pura*, and when the new race—the industrial workers—sought help from the educational system, no aid could be given. There were no industrial training schools, no plan or means for vocational education. Even in the later days when some universities included departments to fit men for mining engineering, the pupil must first swallow the ancient prescription and prepare himself for a vocation where classical training would be essential before being admitted to study coal mining.

Even in the new School Code of Pennsylvania, which marks an advance step in the history of the public-school system of that great coal-mining state, there are weakness which indicate at least a lingering influence of a theory suited only to past conditions.

The Vocational Schools Not Suited to Hard-working Miners

For example we refer to:

Article XIX—"Vocational and other Special Schools"—Sec. 1901—"The board of school directors of any school district of the second, third or fourth class in this Commonwealth upon the application of the parents of 25 or more pupils above the age of 14 years, residents of the school district, shall open a free evening school for their instruction in spelling, reading, writing, arithmetic and such other branches as the board may deem advisable.

"Such evening school is to be kept open for a term of not less than four months in each year and each of said months is to consist of twenty days (which indicates five nights each week) and each evening session to be open at least two hours.

"No pupil shall be admitted to said evening school who is unemployed during the day, or in actual attendance upon any school, either private or public, during the day. When, however, the average daily attendance falls below fifteen pupils the board of school directors may close such evening school for the remainder of the term."

Experience in private vocational schools for miners proves that sessions two nights each week is all that is com-

*Mining Secretary State Y. M. C. A. of Pennsylvania, Second National Bank Bldg., Wilkes-Barre, Penn.

patible with conditions under which vocational schools in mining communities must operate. Today the public-school system is casting aside its robe of precedents, hoary with classical dignity, and is preparing to be an institution of this present period, so that it can deal adequately with the problems of today. The organization of parents and teachers should become a vital factor in the foundation of the new structure.

The New Industrialism with its Unsolved Problems

That revered institution which was an inspiration to goodness and achievement in former days—the typical American home—the maker of patriots, the guarantor of national honor and integrity, began to collapse with those infirmities which hamper old age as soon as the virility of young manhood is gone.

The greatest struggle, perhaps, was in our body politic, and here, as in other institutions, regardless of reactionary, progressive, saint or crook, our form of government will finally rise superior to traditions and opposing forces, become equal to the demands of the times and will maintain the integrity of the greatest nation of free people in the world's history.

The wheels of society have failed to mesh and the result has been lost motion, dissipated energy, undue strain on the human engine, inefficiency, misunderstandings and unrest.

This condition has given birth to individual and organized efforts to meet the apparent needs of the new period. Individuals have given their means, thought and time in devoted service to help their fellowmen. Societies have been formed, vocational schools organized and country-life movements projected. They have been the path-finders for state and national institutions.

Unrest, Like Energy, is Not Necessarily Destructive

There is social unrest in the coal situation, but it is not necessarily dangerous unrest. Never in our history, however, has this country needed patriots as it does today. Never was moral courage so essential.

But to be a patriot and march alone oftentimes, standing for principle when no banner waves, restful amid the unrest, serving without public recognition or hope of personal reward, doing what may be done to preserve the integrity of American society while our great institutions gradually find themselves and gain the mastery—helping to stem the tide of social unrest by aiding to meet the needs of the period—that requires moral courage, personal dignity and ceaseless vigilance. Great is the glory of the true patriot. To be a patriot today is a man's job.

This is not, however, so much the period of social unrest as it is the time when that unrest is being recognized, and its needs adjusted. The big job for every man in every industry today is to be a patriot. The first test of patriotism is honesty, the second is courage and the third is service.

The Industrial Radical Has Declining Influence

But to get back to our starting point. Men who spend their time preparing lurid statements against the employers of industrial workers, denouncing every beneficent act of employers as the cloak of a hidden, vicious motive, and striving to develop in the hearts of fellow workmen malice and prejudice, are not patriots, and only delay the social betterment of those whom they claim to serve.

Employers who fail to recognize that men are men, and count employees as parts of a great machine with no human rights, are not patriots, and are standing in the way of industrial advancement and genuine personal success.

One of the most encouraging signs of the times, however, is that so few men, employee or employer, today hold the radical views indicated, while the ranks of the patriots are increasing; in fact, it is here, among captains of industry and industrial workers, that we find a long list of path-finders who have been pioneers in promoting and developing that welfare work which has been a mighty influence in remodeling our institutions and leading them toward the place that makes for social rest and industrial peace.

Wanted—A Sociologist!

The United States Civil Service Commission announces an examination on Aug. 24 to fill a vacancy in the position of mine technologist in the Bureau of Mines, field service, at a salary ranging from $1800 to $2400 a year. The duties will be a general study of mine conditions, especially in the coal fields of the United States, and a study of those conditions as affecting the welfare of the miners.

Applicants must have had graduate work in economics in some college of good standing, especially in industrial branches of the subject. Competitors will not be required to appear at any place for examination. The subjects and weights will be as follows: General education and scientific training, 35; professional experience along industrial lines and fitness, 30; publications, theses, etc., 35.

In furnishing material under the last-named subject any published works, unpublished maunscripts, or theses may be submitted. Letters of recommendation from teachers or colleagues also may be submitted under this subject. The age limit is 24 to 40 years, inclusive, on date of examination. Forms can be obtained from Secretary H. C. Coles, New York Custom House.

A Plea for the Miner

By R. H. McIntyre*

I wish to say a few words about the treatment of miners by owners and managers of coal mines. When company officials learn to treat their employees as human beings instead of as so many mules devoid of power to think and feel, they will find that it will pay them not only in avoiding accidents, but in the matter of dividends as well.

There are coal companies in America, also in other countries, which are striving for the betterment of their workingmen, but the vast majority think of their employees only as so many cattle or mules, and only adopt precautionary measures to avoid accidents when the law compels them to do so.

I think that if coal companies would build schools, furnish libraries, provide suitable sports, and give employees time to participate in such pleasures, instead of hiring so many foreigners and driving them like cattle, that they would find it would pay in hard cash as well as in moral satisfaction.

Simply because a man has to work with his hands is no reason he should be treated as an animal. No right-minded person can fail to believe in moral as well as intellectual training, and I am of the opinion that it will pay the mine owner to look after the welfare of his employees. I have noticed that where good wages are paid and conditions favorable, accidents are fewer, and men are easy to get; on the other hand, where low wages are paid and a man can scarcely make a living, employees are hard to obtain.

It is a well known fact among laboring men that coal miners do not receive as much for their labor as do other classes of skilled workmen, while the conditions of employment are worse, and the work more dangerous.

The average man is not slow in remembering a kindness done him, and if a company would try to better the conditions of its employees, it would come out on the winning side, but so long as such low wages are paid that only ignorant, incompetent men can be obtained, accidents are bound to happen. On the other hand, if the companies would bring their men to a realization of the ever-existing dangers connected with coal mining, and make each individual a thinking unit, these conditions would be materially improved.

No matter how learned, technically, a mine foreman or superintendent may be, what advanced methods of handling coal he uses, or what kind of equipment he has, just so long as most of the men who work under him are careless and ignorant, accidents are bound to take place.

In my opinion, it is worth the consideration of every mine owner to look after the welfare of his men.

*Carthage, N. M.

Coal and Coke News

From Our Own Representatives in Various Important Mining Centers

Washington, D. C.

Members of Congress have been considerably surprised at the action of Secretary Fisher in submitting to the House committee on public lands a plan for dealing with government coal resources, which would result in a considerable change of present methods by permitting cities to which coal lands might be allotted to undertake the mining of their own coal. Violent opposition by private coal-mining interests is expected to the plan of the Secretary of the Interior to allot government coal lands in this way to Western cities. When a certain bill, authorizing a grant to Grand Junction, Colo., comes up in Congress, this opposition, it is said, will make itself plainly felt.

Secretary Fisher has recommended that Congress grant 640 acres of coal land in the vicinity of Grand Junction to that city, and, in the meantime, the Department of the Interior has withdrawn the land from private entry. The right of the secretary to order this withdrawal in the absence of express authority conferred by statute will of itself be the subject of hot debate, for some Western Congressmen deny that such an executive order is legal.

Secretary Fisher plans that allotted government coal lands shall be operated by the cities to which they are granted so as to supply municipal needs as well as those of individual citizens. A general bill, drawn up by the secretary, authorizes him to patent 640 acres for each city under conditions providing for prompt and continuous development of the coal, the prevention of any assignment or transfer and the safe-guarding of the lives and health of miners working for the city.

Congressman Taylor, of Colorado, will offer the bill making the grant to the Colorado town, and will endeavor to get it passed at this session. There is not so much likelihood of the general bill coming up at this time. It is the opinion of Secretary Fisher that all cities situated in states which contain government coal lands, desiring to mine coal and supply municipal needs and the needs of their citizens, should receive limited areas of those lands, provided that the coal be mined and disposed of under proper regulations. Following this principle and a tentative grant, Secretary Fisher has recommended that Congress enact a bill to make the desired grant to the city of Grand Junction.

The general bill suggested would authorize the Secretary of the Interior to patent 640 acres of government coal land for each city and 160 acres for each town under conditions providing for prompt and continuous development of the coal, the prevention of any assignment or transfer of the land, the safeguarding of the health and safety of laborers mining or handling the coal, the prevention of undue waste of mineral resources, and the procuring of full report and publicity as to the mining and disposal of coal mined under the patent, including cost of construction, maintenance and of operation, use for municipal purposes, sales and receipts from sales.

The secretary believes that any such patent should be safeguarded by the provision that the title of the land patented shall revert to the government if any city or town to which coal land shall be patented shall at any time fail to perform any of the conditions of the patent.

This policy, he insists, is in conformity with conservation principles and is not inconsistent with the principle of governmental leasing of coal lands for private development, which he advocates, is due to the distinction drawn between municipal corporations and commercial corporations. Secretary Fisher maintains that the aim of the federal conservation policy with respect to government-owned coal lands is to insure for the public an abundant supply at prices which will yield a fair return and no more upon the capital invested in mining and handling the coal. This is impossible when a fee simple patent is granted to private persons or corporations for the commercial exploitation of the coal deposits.

When the title passes from the government, its control ceases and the patentee is placed in such a position that he can exact from consumers the highest price for the coal mined from the lands that their necessities may compel them to pay.

The leasing system, says Mr. Fisher, is the only method for the private exploitation of government-owned lands which can protect the public. By retaining the title in its own hands and properly conditioning the lease, it will be possible to protect the public from extortion.

It is desirable to retain in the hands of the federal government a certain amount of supervision to make sure that the city will actually develop the coal without waste, and with due regard to the health and safety of the miners; also that all the transactions of the city be given the fullest publicity to prevent any opportunity for corruption and abuse, and to keep the federal government and the general public fully informed as to just how the legislation of this character is operating in actual practice.

Alabama

Lime Rock—An announcement has been made that a new mine on the Belmont seam at Lime Rock, on the Memphis division of the Southern Ry., has been completed. The railroad to the mine is expected to be finished by October, and then active mining operation will be begun. The new seam averages about 30 in. of clear coal.

Colorado

Cripple Creek—Official canvass of the referendum vote showed that President C. H. Moyer, of the Western Federation of Miners, in session at Victor, has been re-elected.

Denver—Statistics show that 576,000 tons of coal have been shipped during the last year over the Moffat road. The full significance of the figures is better understood when it is realized that not a single ton of coal was shipped out of Routt County until this road had been completed as far as Steamboat Springs.

It is expected that this output, valued at $1,500,000, will be doubled within 12 months after the road is extended into the anthracite fields.

Illinois

Bush—The American miners employed at the mines of the Western Coal & Mining Co. have gone on strike because they contend that the operators are discriminating in favor of several hundred foreign miners. The Americans number 300 men. The miners' union here has had three presidents within two days, all of whom resigned as a result of the friction.

Harrison—The Harrison shaft, which shut down April 1, has resumed work. Coal machines have been started and coal has been already hoisted.

Harrison employs nearly 200 men, and it is thought that the continued idleness there will mean a season of good work, now that operations have resumed.

Lincoln—The officials of the sub-district of the United Mine Workers have refused to recognize the strike of the

miners of the Citizen's Coal Co., which has been in progress for the last three weeks, and the miners will have to return to work before the officials will take any recognition of their grievances.

The miners refused to continue work because their mine boss began to enforce a new agreement, which has been entered into by the mine owners and mine officials. The miners, however, declared that the agreement was unjust in regard to pay for cutting entries. The entire force of 150 men struck.

Since the miners had violated their agreement, the officials refused to recognize their walkout, although a mass meeting of all three miners' unions in the city was held to influence action. The miners have been ordered back to work and then the officials declare they will consider their grievances.

Marissa—One man was hurt and $25,000 damage was done recently, when a fire of unknown origin was discovered in the engine room of the White Oak Mine.

The mine had been idle since April, and is owned by the Egyptian Coal Mining Co. It is said that it will require two months to replace the loss.

Murphysboro—The Schmidgal Coal Co.'s mine here has been abandoned as a commercial proposition. A large tile and brick plant will be built in the immediate vicinity and both the coal and the fireclay will be mined for this plant.

Nokomis—The Onedia Coal Co. intends to sink a mine on the west side of this city. Work of water sounding has begun, and the location will be agreed upon immediately.

It is the purpose of the company to make this mine up to date and modern in all requirements.

Zeigler—The coal operators of Franklin County have arranged to lease the hospital at this place, which was erected by Joseph Leiter when the Zeigler mine was opened. The hospital has been deserted for three years, but recently the operators in Franklin County have decided that it is to their advantage to give their employees proper treatment in view of the recently enacted liability laws.

The institution will be in charge of Dr. J. B. Moore.

Indiana

Indianapolis—After three prolonged sessions, members of the joint wage-scale committee of Indiana miners and operators, accepted the report of the subcommittee which was appointed to investigate local conditions in machine mines and to recommend a readjustment of the machine wage scale. The report eliminates the wage differential that has existed in mines using puncher machines and provides that the entire advance in wages allowed by the Cleveland agreement shall be given to the loader exclusively in mines using electric power machines.

The report is as follows:

Your committee after careful investigation of facts, figures and conditions at the machine mines in Indiana recommends:

First, that the division of the price to machine runners, helpers and loaders, using puncher machines north of the Vandalia track be eliminated, and that the division heretofore obtaining in the years 1910-12, south of the Vandalia track be made effective in both localities.

Second, that the Cleveland advance from machine mining for all electric machines be given to the loaders exclusively, the machine runner and helper to receive the same wage they received under the agreement of 1910-12, except where the coal averages less than 4½ ft. in thickness on any electric machine run. The Cleveland advance shall be divided under the agreement of 1910-12.

Through the readjustment of the machine wage question, which has been an unusually hard problem for many years, all machine runners, loaders and helpers employed on puncher machines in the mines north of the Vandalia track, lose the amount of the differential (about 2c.) minus the 5.26 per cent. advance granted at the Cleveland advance; and the runners and helpers receive the same wages as during the last two years.

It is believed that the decision will bring peace among the men.

A bill, providing that all public institutions of the State of Indiana shall be required to burn coal mined by eight-hour labor, has been prepared ready for introduction in the next legislature. The matter has been taken up by the home officers of the International Mine Workers and a similar bill will be introduced in every state mining coal. The Indiana miners are said to be in sympathy with the bill and will work for its enactment at the next legislature.

Parkersburg—An injunction has been issued by Judge Wilson, of the Owens County Circuit Court, against George Morganthaler, international organizer, and the striking miners of the Rowland Coal Co. The miners are prohibited from assembling in groups, accosting the strike breakers while going to and from their work and intimidating them or making threats. Efforts are being made to extend the strike to other pits in the field.

Seeleyville—Mine No. 66 of the Vandalia Coal Co. has been closed down permanently, and the company is now removing the track, pumps and all underground equipment. The tipple will also be taken down.

The mine is one of the pioneers of the Seeleyville district. It has been an "old faithful" in the production of coal. Its capacity was about 900 tons per day and employment was furnished for about 200 men.

Sullivan—The business men and citizens of Sullivan, Ind., have taken steps toward the running of a miners' train from Sullivan to Carlisle. The opening of two new mines at Paxton by the Wooley Coal Mining Co., adds about 500 miners to this locality.

Ohio

Columbus—The policies of former Chief Mine Inspector George B. Harrison will be carried out, at least for a time, by the present inspector, James Davies, who has just assumed his duties.

Mr. Davies is quoted as saying: "Mr. Harrison was recognized as one of the best mine inspectors in the country, and I certainly will not attempt to make any changes until I am thoroughly convinced of their needs."

Coshocton—The Morgan Run Coal Co., of Cleveland, shut down its Coshocton mine and ordered its men out when they demurred at a new rule. The company insists that the men work their full eight hours in the coal and prepare for the next day's "shooting" on their own time instead of the company's. About 20 minutes time is involved.

Oregon

A movement is under way here, headed by the Portland Chamber of Commerce, to establish a regular line of steamers between this port and the Orient and a fund of about $225,000 is being raised to assist in getting the line established. The establishment of such a line will mean further demand for bunker coal here, and this will prove of considerable importance to the coal trade, as the intention is to run at least one steamer a month, each of capacity to carry about 7000 tons of cargo.

Pennsylvania

Anthracite

Mahanoy City—Fire destroyed the Girard colliery at Ravens Run on Aug. 7, causing a $175,000 loss.

The breaker was built three years ago and has all the modern improvements, employ 400 men and boys, and ships 400 tons daily.

Pittston—The driver bosses employed by the Lehigh Valley Coal Co., at its various collieries in this vicinity, have been notified that they must undergo the required examination and obtain assistant mine foremen's certificates in order to hold their positions.

They will also be classified as monthly men instead of day men. Heretofore, they have been paid at the rate of $3 per day, but under the new ruling, they will be given a monthly salary of $85. This new order is in reality a reduction in wages, since the men will not receive pay for overtime.

Pottsville—Independent coal operators and officials of the larger companies declare that two-thirds of the anthracite coal now being mined is unsold and accumulating. All the storage yards in

this section, which were cleaned out last March, when a strike of the mine employes was threatened, are rapidly being filled again.

The Reading Railroad's big new $1,000,000 yards at St. Clair were crowded recently with loaded cars, the destination of which was the storage yards. It is expected that a partial suspension of mining will be put into effect in August until the fall trade reopens.

Scranton—The United Mine Workers' convention of district No. 1, before adjournment, adopted resolutions in favor of fighting in the next legislature for various bills, including workingmen's compensation, eight-hour day for all mine workers, making foremen eligible for inspectorships, payment for mining coal by weight, old age pension and prohibiting pump men and engineers from leaving their posts or being required to do other work.

Shamokin—Five hundred men were given employment at the reopening of the Bear Valley shaft, on Aug. 1. This resumption of work followed the extinguishing of a fire, which has raged over a year, in the rich croppings. The shaft is owned by the Reading Coal & Iron Co.

South Bethlehem—The fires have been lighted under the first completed battery of 75 coke ovens at the Zidier-March company, and as a result of beginning of operations the first coke is expected to be manufactured in a few days. The work on finishing the 225 ovens is being rushed day and night.

BITUMINOUS

Greensburg—Arrangements for the first-aid demonstration, to be held at Oakford Park, near Greensburg, Penn., on Saturday, Aug. 17, are progressing rapidly.

Twenty-four teams have been entered, coming from the Westmoreland Coal Co., Penn Gas Coal Co., Manor Gas Coal Co., Jamison Coal & Coke Co., New Alexandria Coke Co., Penn-Mary Coal Co., Republic Iron & Steel Co., Pittsburgh-Baltimore Coal Co., Tower Hill Coal & Coke Co., N. Y. & Cleveland Gas Coal Co.

Judges will be J. W. Paul, Bureau of Mines, E. E. Bach, Ellsworth Collieries Co., Dr. J. S. Lawrence, Greensburg, Penn., Dr. C. C. Gans, Brier Hill, Penn., James Fleming, Cresson, Penn., and one to be selected yet. Lieut. M. J. Shields, of the American Red Cross, will award Red Cross medals to the winning teams. The bituminous committee will give a first-aid cup as first prize, copper shield as second, and a J. & J. cabinet as third.

Isabella—The coke plant, at Isabella, which was partially constructed two years ago, is to be completed in the near future. The plant is to consist of 500 ovens.

Marion Center—A large coal deal is expected to go through soon in this section. The field in question embraces over 55,000 acres, and the price of the land option averages $40 or over an acre, making a total of $2,200,000.

Six diamond drills are in the field and have been pushing tests as rapidly as possible. Most, if not all of them, are running night as well as day. Testing in the lower part of the field has been about completed, and the drills are to be moved into the eastern section.

Two will be located in the Pickering Run section soon, and two corps of engineers have been in the field for some time mapping out locations, levels, etc.

Just who is back of the deal is not known, but it may be safely stated that there is plenty of capital behind the development.

Pittsburgh—A receiver has been appointed to take charge of the affairs of the Great Lakes Coal Co., a $5,000,000 corporation of this city.

The company owns valuable coal lands in Armstrong and Lawrence counties, and also owns the Western Allegheny R.R. Co. The mines of the company have been shut down for some months, owing to differences with its miners.

Tennessee

The director of the geological survey has announced that a report on the coal-bearing area of the Herbert Domain has been prepared. Maps of the geological formation of Pikesville and Crossville regions are being worked up. A summary of oil and gas explorations in the state will be included in a bulletin soon to be published by the survey.

Knoxville—The construction of an office for the Southern Coal & Coke Co.'s retail yards is nearing completion.

The Carolina, Clinchfield & Ohio R.R. has established a rate of $1.25 from Virginia mines to Charleston, S. C., a rate on which it expects to haul considerable coal for bunkerage and export business. This new road is also preparing to handle a large amount of coal to vessels at Charleston and to this end has begun the construction of terminal and unloading facilities that will cost about half a million dollars.

Washington

Seattle—In anticipation of labor trouble at the mines in western Washington, the Northwestern Pacific Ry. Co. is storing 45,000 tons of coal at its Puget Sound terminal.

It is said that the agreement between the operators and miners will end Sept. 1.

West Virginia

Charleston—Fifteen hundred more miners went on strike, Aug. 9, in the Kanawha field. There was no rioting, however, and the militia at the Paint Creek junction reportetd that all were quiet.

The reason for the strike is said to be that the miners were refused a pay-day on the second and fourth Saturdays in the month, and were told that they would be paid every third and fifth Saturday.

Elkins—Terriffic storms have put the northern end of the railroad, owned by the Coal & Coke Ry., almost out of business.

At two of the Davis Colliery Co.'s mines the tracks have been washed from under the tipple and damage to houses and other buildings has been so general, that it will be several days before coal and coke can be shipped from the works.

Grafton—Considerable difficulty is being experienced by travelers along the Grafton and Fairmont Pike, on account of the sinking of the road for a distance of 100 feet.

The road has dropped about 9 ft., which is the approximate thickness of the coal bed under the surface. A general supposition is that there has been a break of rock over a mine, and this has caused the road to fall.

Reedsville—Supervisor E. H. Wingrove, of the M. & K., has a force of men at work laying out the tracks needed in the opening of the Elkins Coal and Coke Co.'s new No. 7 mine between Reedsville and Bretz.

Nearly half a mile of trackage is now completed and only a few hundred feet remain to be laid. The company is now loading 10 carloads of coal per day from the 4 openings on the new mine, but they cannot operate at their capacity, which is 40 carloads per day, until the tipple has been completed.

Wyoming

Owl Creek—The President has signed the Warren resolution, authorizing the continuation of mining operations at the Owl Creek coal mines, until litigation between the owners and the Government can be concluded.

Four hundred miners and other workmen were threatened with loss of work through the proposed closing of the mines.

Germany

WESTPHALIA

Bochum—An explosion of blackdamp and coal dust on Aug. 8, in the Lorraine shaft in the village of Gerthe, cost the lives of 103 miners, according to official reports.

Two others are severely injured, and 23 slightly injured. Death was practically instantaneous in all cases.

The cause of the explosion has not yet been definitely ascertained, but it is thought that a blast reached a large pocket of gas.

The day shift of 650 men had just descended into the workings and were distributing themselves among the various levels, when the explosion took place.

Personals

K. T. Swensen, formerly of Nanking, China, is now employed by the S. W. Horne Co., dealers in American machinery, Yokohoma, Japan.

D. E. Edwards, formerly connected with the Colonial Coal Co., at Prestonburg, Ky., has accepted a position as general manager of the Pine Grove Coal & Iron Co., of Ironton, suceeding C. C. Smith.

J. Freeman, of Terre Haute, Ind., has been nominated for state treasurer by the republican party. Mr. Freeman is one of the most successful coal operators in Indiana and employs a large number of men.

Assigning poor health as the cause Richard Newsam of Peoria, president of the Illinois state mining board and manager of the state mine rescue stations, has sent his resignation to Gov. Deneen. He was appointed head of the state mining board in 1898.

Alex Bonnyman has accepted the presidencey of the Campbell Coal Mining Co., which operates on a large scale in Kentucky and Tennessee. He has been general manager and chief engineer of the Atlanta, Birmingham & Atlantic R.R., and he has agreed to retain his connection with the road as chief engineer.

W. H. Cunningham, of the firm of Cunningham & Carter, consulting engineers, with officers in the Blackstone Building, Ashland, Ky., and the Robson-Prickard Building, Huntington, W. Va., has been appointed assistant state geologist of Kentucky. Mr. Cunningham is also secretary-treasurer of the Mine Owners' Association, of Kentucky.

R. T. Johnson, formerly with the Pinner Coal Co., of Nashville, Tenn., has resigned to enter the insurance field as cashier for a consolidated insurance agency in Nashville. The consolidation of several agencies in the Tennessee capital was only recently effected, and Mr. Johnson was made cashier after extended negotiations. He has been in the coal mining fields for several years.

Trade Publications

The Hyatt Way. Hyatt Roller Bearing Co., Newark, N. J. Published once every month in the interest of anti-friction bearings, by the Hyatt Roller Bearing Co. 8 pp., 6x9 in.

The Harvester World. International Harvester Co., Chicago, Ill. An anniversary number reviewing the 10 years' progress of the International Harvester Co. 36 pp., 7x10 in., illus.

The Blow-off, issued monthly by Yarnall-Waring Co., Philadelphia, Penn.

Industrial Narrow-Gage Railways, Catalog No. 12, published by C. W. Hunt Co., West New Brighton, N. Y. Eighty pages, 6½x9½ in., illustrated.

Book Review

ELECTRICAL INJURIES, THEIR CAUSATION, PREVENTION AND TREATMENT. By Charles A. Lauffer, medical director, relief department, Westinghouse Electric & Manufacturing Co. John Wiley & Sons, New York. Cloth; 4x6½ in.; pp VI + 77, 1 ill. Price, 50c., net.

This book is prepared by a man whose practical experience of the treatment of electrical burns and shocks, is larger than that which falls to most practitioners. His book is addressed to practical electrical men, and with few exceptions its wording is well chosen. We wish the author had been able to devote the whole book to the one subject but on p. 39 he takes up "Minor Surgery and First Aid" followed by "Infections" and "The Effects of Occupation on Health."

He makes it clear that the effect of contact with electrical conductors is not determined solely by the strength of the current or the excellence of the grounding but also largely by the susceptibility of the patient. "There is a wide variety of external and individual conditions which influence the extent of electrical injury and there is an interdependence of circumstances which makes tabulated results and records of accidents apparently inconsistent. At one time 110 volts are involved and there is a fatal accident; at another 15,000 and more and recovery will ensue.

Static Voltage Cause of Accidents

"While fright is an important element, it may not explain everything; when an unemotional man meets a tragic death, it is with difficulty attributed to his imagination. A long distance high-tension transmission line disconnected from the sources of power may build up a high static voltage, due to the action of the atmosphere, even in dry weather. It is interesting to note that what appeared to be a Leyden-jar or static-condenser effect has been observed by an experienced practical electrical man with whom the writer is acquainted. On one occasion, upon going to the rescue of a man, who had been momentarily rendered unconscious as the result of a shock, he received a discharge from the man's body, notwithstanding it was free from contact with the circuit by which he had been prostrated.

"This rather unexpected phenomenon may possibly be accounted for by the fact that the ground, wood, cement or brick floor on which the body lies, may be too dry to carry off the high static charge which it has received, and the rescurer on grasping it may experience a rather heavy electrical "kick." While this experience is unusual, yet in the case of transformer coils, after high voltage tests, it is found they frequently contain a high static charge, which remains for many minutes after the apparatus is disconnected from the circuit."

Obituary

John P. Heinrich, aged 67, and for the past forty years engaged in the wholesale and retail coal business in St. Louis, recently died at his home there. He was for many years a sufferer from a peculiar form of blood affliction.

J. C. Porterfield, a well known mining engineer in the Illinois and central western coal fields was recently found dead in bed at his home in Du Quoin, Illinois. He was, at the time of his death, engaged in the erection of the top works and the sinking of a new mine at Christopher, Illinois.

John Chesterfield, Sr., one of the pioneer coal operators of the Brazil block field, and for 47 years a mine superintendent for the Zeller & McClelland Coal Co., died Aug. 8. Mr. Chesterfield was born in England and came to Clay County, Ind., when a boy. When 17 years of age he became one of the first coal miners and subsequently an operator.

Industrial News

The Jeffrey Mfg. Co. have moved their Chicago headquarters and offices from the Fisher Building to the McCormick Building, recently completed, and considered the most modern and uptodate fireproof office building in Chicago.

S. S. Shive, sales engineer is the district manager in charge of the Chicago office.

The Roberts & Schaefer Co., Engineers and Contractors, McCormick Building, Chicago, have just been awarded a contract by The Chesapeake & Ohio Ry. Co., of Indiana, for three large Holmen balanced-bucket type coaling stations. One to be erected at Peru, Indiana, having a capacity of 500 tons, the other two to have a capacity of 300 tons each, being duplicates, to be erected at Janney, Indiana, and English Lake, Indiana. $35,000.

This company has also been awarded the contract for a modern coal washing plant to be erected in the southern Illinois field at Johnston City, at the mine of George B. Pope Co. $16.000.

Construction News

Flint, Mich.—E. B. Foss & Co. of Saginaw and Bay City are sinking a shaft about half a mile from this place and will spend $20,000 in the development.

The shaft is to be of solid concrete construction and the total depth will be 246 feet. The new mine will be christened What Cheer No. 2. The mining company has secured privileges on several hundred acres in the vicinity, and the coal pockets extend to the city limits. Employment will be furnished for 300 men.

The Genesee Coal Co. is also sinking a shaft near Flint. These people think they have struck the heart of a big coal field, and plan to begin mining operations next year. Samples show analyses that run very high in B.t.u.'s and low in ash for Michigan coal.

Shenandoah, Penn.—Maderia Hill & Co., who are interested in the operation of mines in this region, now have no less than ten collieries in the different sections of the hard coal fields. They have acquired the Wilkes-Barre Colliery Co. at Plains and will erect a modern breaker there to handle the output of a 76 acre tract.

Coal Trade Reviews

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

The upward trend of the coal market is still in evidence, the improvement being general almost without exception. In bituminous there is a spot market for small lots developing at nearly all the centers and quotations on the better grades are showing a decided tendency to advance.

The anthracite shortage is getting more serious, with stove almost entirely out of the market, and it is a cause for wonder that the dealers are not more alarmed. The visit of President White through the anthracite field is interfering with the production and causing no little anxiety among the companies. The sales departments are pushing the operating end to the limit, and August promises to outstrip any corresponding month in the history of the trade.

Prices in the Eastern bituminous market are at about the same level but considerably stronger. There is no evidence of the car shortage improving and it is generally conceded that there is more business in sight for the next six months than the roads can handle. The control of the market has been lost to the consumers, and none are now holding off buying with the view to obtaining easier prices before winter.

In the Pittsburgh district the demand has increased slightly through heavier requisitions on contract. Shipments to the Lakes are fairly good, but have been curtailed to a certain extent because of the slow movement on the railroads due to congestion and a shortage of equipment. In Ohio the domestic trade is more active and should show considerable improvement from now on. The manufacturing and railroad demand is increasing, but the slow movement at the head of the Lakes has seriously interfered with the production. Prices are ruling firm, and an advance in the circular will probably occur Sept. 1.

In West Virginia the trade is comparatively quiet. While there has been a heavy movement to New England, foreign and bunkering demand has dropped off. Prices on both contract and spot business are being held at full circular.

In the Northwest scarcely any coal is to be had for spot shipment and almost winter conditions are prevailing; the scarcity in anthracite is quite acute. Through the Middle West orders have increased on nearly every grade and prices advanced on some.

Boston, Mass.

The upward trend in bituminous is now quite pronounced. New England always shows more interest in a rising market than at any other time, and with the advance in water freights, prices generally are going to be firm as the season advances. There is also a spot market developing for small lots and there is renewed inquiry for cargo shipment. There will be no difficulty about maintaining f.o.b. prices for the balance of 1912.

Advanced prices are also being had on the favored grades from Pennsylvania. Georges Creek is having a better call at the contract figure than for the past few months.

The anthracite situation is getting more and more serious. Stove is next to impossible to get in any quantity and egg and chestnut are almost as slow coming down. It looks as if a good many consumers would have to content themselves with egg or chestnut in place of stove. There is cause for wonder that dealers generally are not more alarmed then they appear to be. The prospect out of New York is certainly discouraging. Where the coal is to come from to fill the demand from all directions is a question none can answer. Stove readily commands the chestnut price, and a larger premium may be expected.

Wholesale prices are about as follows:

Clearfields, f.o.b. mine	$1.10@1.30
Clearfields, f.o.b. Philadelphia	2.35@2.55
Somersets, f.o.b. mine	1.20@1.40
Somersets, f.o.b. Philadelphia	2.45@2.65
Pocahontas, New River f.o.b. Hampton Roads	2.70
Pocahontas, New River on cars Boston	3.70@3.78
Pocahontas, New River on cars Providence	3.63@3.73
Anthracite stove f.o.b. New York	5.20@5.50

New York

Bituminous—The soft-coal market at this point is moderately strong and shows every indication of continuing so until the active fall and winter trade opens up. There is evidence of a slight tendency on the part of the consumers to stock, and business for the current month has so far shown an improvement of about 20 per cent. over that for July; this is mostly due, however, to the increased requisitions on contract.

The shortage in anthracite is having a noticeably stimulating effect on the bituminous market, which will probably be more pronounced as the season advances. The demand is confined principally to the line trade, that for tidewater being small. There is a growing shortage of labor and railroad equipment, and, while not of serious proportion as yet, it is having some effect on trade conditions.

Some low-priced coal is reported at Port Reading and St. George, but at South Amboy stocks are only about one-half normal, with prices somewhat stronger.

Quotations are relatively firm as follows:

West Virginia, steam	$2.35
Ordinary grades, Pennsylvania	2.45
Fair grades, Pennsylvania	2.55@2.65
Good grades, Pennsylvania	2.70@2.75
Best Miller, Pennsylvania	2.95@3.00
Georges Creek	3.15

Anthracite—The activity in anthracite continues the past week seeing premiums of 20c. offered on stove, which is in very short supply. This has resulted in diverting a considerable portion of the business to egg, and brought about the same condition in that grade. Buckwheat continues to be the longest of the steam grades, and it is quoted at 20 to 25c. off the circular. Rice is holding fairly firm at the upper ports, but is 10 to 20c. off the circular at the lower, while barley continues about 15c. off.

The wholesale demand continues heavy, and the larger companies report stocks on hand far below normal for this period.

Quotations at New York are about as follows:

	Upper Ports	Lower Ports
Broken	$4.90	$4.50 @ 4.90
Egg	5.15	5.05 @ 5.10
Stove	5.15	5.10 @ 5.20
Nut	5.40	5.20 @ 5.35
Pea	3.50	3.30 @ 3.45
Buckwheat	2.75	2.15 @ 2.55
Rice	2.25	1.75 @ 1.95
Barley	1.75	1.60 @ 1.70

Pittsburgh, Penn.

Bituminous—Demand for coal from manufacturers has improved slightly, through heavier requisitions on contracts, though there is little improvement in new purchases, and prices are still irregular, with offerings of slack particularly heavy. Lake shipments are fairly heavy, but the railroad movement is slow, there being congestion in some of the yards, and car supply is not good at many of the mines. We continue to quote for ordinary lots: Mine-run and nut, $1@1.05; ¾-in., $1.25 asked; 1¼-in., $1.35; slack, 50 cents.

Connellsville Coke—The coke market has stiffened decidedly, all the coke that was pressing the market being disposed of, so that prompt furnace is now held rather firmly, $2.25 at $2.30 being frequently asked, particularly for delivery over two or three weeks. The principal

single transaction in the week was the sale of 15,000 tons of furnace for August and September shipments at $2.30. Inquiry has been much larger in the past few days, and several furnaces had to buy coke to round out their August requirements. Two or three furnaces have blown in, resuming the taking of coke on old contracts. The market is firm on the following quotations: Prompt furnace $2.25@2.30; contract furnace, $2.30@2.35; prompt foundry, $2.40@2.50; contract foundry, $2.40@2.75.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ending Aug. 3 at 379,157 tons, an increase of 66,000 tons, and shipments at 4171 cars to Pittsburgh, 6359 cars to points west and 839 cars to points east, a total of 11,369 cars, an increase of 2000 cars.

Baltimore, Md.

A slight increase in inquiries was reported by many coal operators in Baltimore, during the week, but it was not sufficient to affect prices which have remained stationary for the past three or four weeks. A large tonnage, moving under contract, is being shipped to Baltimore, some of it for export, but, for the most part, bound for New England and Southern ports. There was considerable activity at the Port Covington piers of the Western Maryland, the Curtis Bay piers of the Baltimore & Ohio and the docks of the Northern Central Ry. Co., located at Canton. All semblance of any strike troubles at the piers has disappeared, and fuel is being loaded with the customary dispatch.

The trade does not believe that consumers who stocked up previous to the strike have any too much fuel on hand, and that it will only be a matter of a few weeks before they are compelled to enter the market again. Reports received at many of the offices in the past day or two were that not a few consumers were reaching the bottom.

By the last of this month, when operations on the Western Maryland's new extension have been smoothed out, it is predicted that a considerable tonnage from the Pittsburgh district will be shipped through this port for export, as well as for coastwise ports.

Conditions on the West Virginia division of the Western Maryland, are normal again. The hard rains played havoc with the portions of this line running into the Davis Coal & Coke Co.'s property, near Thomas, and for days the line west of that point was blocked.

Philadelphia, Penn.

The middle of the month has passed and sees no cessation in the demand for anthracite coal. Some anxiety is felt over the visit to the coal mines of President White, who is on a trip through the region, no doubt in an effort to bring to the fold of the union many who have slipped away since the resumption of operations at the mines. The sales departments of the companies have been pushing their mining end to increase the output, and every effort is being bent with that end in view, but with poor success, as manifested by the fact that there still continues a very pressing demand for the coal. On top of this comes the curtailment occasioned by Mr. White's visit, which is not at all welcome.

From present indications, the month of August will far outstrip any corresponding period in the history of the trade. There does not seem to be any apparent letup in sight. Operators claim to have inquiries from concerns not only in the South and East, but in the provinces that were totally unknown to them. There seems to be a disposition on the part of some of the companies to cater to their rail business, rather than to tidewater, and, as a consequence, those who make a specialty of this class of business are flooded with orders. Large quantities of pea, buckwheat and rice are going into stock, to provide against the fall and winter demand, which is bound to be heavy.

In the bituminous trade, the improved tone of the market still continues, and while there is nothing definite on which to make the prediction, it is the expressed hope that it has come to stay. Prices seem to be a little more uniform and stable, and in some instances advances of 5 to 15c. over last week's quotations are noted. Good coal, however, is still in the market at $1 at the mines.

Buffalo, N. Y.

The demand for bituminous coal improves slowly but steadily, and as the volume of trade has been good for some time, the outlook is decidedly better than it was a month ago. There is now a new element entering into the calculation—the shortage of cars—which is bound to advance prices, though it may not alone increase the profits. Already word comes from some mining districts asking a small advance on that account.

The railroads are making every possible effort to stave off the car shortage by borrowing locomotives wherever possible, and, in some districts, have gained materially on the accumulation of loaded cars, but it is everywhere estimated that there is more business in sight for the next six months than the roads can do.

It cannot now be said that any section is holding off buying bituminous, with any notion that prices are to be easier before winter. On the other hand, there are plenty of indications that the consumer is aware that the control of the market is slipping out of his hands.

The continued scarcity of Allegheny Valley slack is still the feature of the market, and it is likely to go on for some time yet. With the stiffening of the price of sizes, the entire market should soon be fully in line. Quotations remain at $2.57½ for Pittsburgh three-quarter, $2.47½ for mine-run and $2 for slack, with Allegheny Valley sizes about 25c. less. Coke continues to be scarce and stiff in price, with the top price $4.50 for best Connellsville foundry.

The demand for anthracite is as sharp as ever, some retailers being more than two months behind their orders and nobody pretending to keep up with them. It is not made even a matter of speculation as to when the demand will be satisfied; a mild winter only will accomplish this.

Hampton Roads, Va.

The past week at Hampton Roads has been comparatively quiet. Coal is being moved to tidewater with fairly good dispatch, and there is not much accumulation at any of the piers, as vessels are reporting daily for cargoes. A heavy tonnage is moving to New England, but foreign cargo and bunkering has dropped off considerably over last week. What contracts are being made are at the circular price and very little spot business is now going at less than this figure. In fact, in the local market, prices have already been boosted. Vessel rates are strengthening up considerably.

Columbus, Ohio

The coal trade in Ohio during the past week has been running along steadily with little change worthy of notice. Trade in domestic sizes is more active and that branch of the business should show considerable improvement from now on. There is also considerable demand for steam grades and the Lake trade is continuing quite active. Prices on all grades are ruling firm and every one is talking an advance in the circular Sept. 1, or possibly Sept. 15.

One of the best features of the business is the better feeling in manufacturing circles which is being reflected in a better demand for steam grades. The tonnage required by many of the larger factories is increasing and that for railroad purposes is also large which indicates a heavier freight movement, especially on the roads in Ohio and adjoining states.

There is some complaint of car shortage which is not confined entirely to the eastern Ohio fields. On the Hocking Valley and T. & O. C. there is lack of coal cars and some of the mines in the Hocking Valley were closed down for a portion of the week.

The Lake trade is somewhat quiet, especially in shipments from the Hocking Valley, due to congestion on the docks in the Northwest.

There is a good demand for the fancy grades for domestic purposes and stocking in these is going on rather actively. Pocahontas is one of the popular grades in central Ohio, and West Virginia splints are also in good demand.

During the week production in Ohio fields has not been quite up to normal due to the Lake congestion and some labor troubles. The car shortage has also cut into the Ohio tonnage.

Quotations in the Ohio fields are:

Hocking Valley	
Domestic lump	$1.50
¾-in.	1.35
Nut	1.10
Mine-run	1.15
Nut, pea and slack	0.50
Coarse slack	0.40
Pittsburgh No. 8	
¾-in.	$1.10
Mine-run	1.00
Coarse slack	0.35
Pomeroy Bend	
Domestic lump	$1.50
¾-in.	1.35
Nut	1.20
Mine-run	1.15
Nut, pea and slack	0.40
Coarse slack	0.30
Kanawha	
Domestic lump	$1.50
¾-in.	1.30
Mine-run	1.05
Nut, pea and slack	0.45
Coarse slack	0.35

Birmingham, Ala.

Large steam contracts are being closed in the Birmingham district at satisfactory prices and general business is showing improvement as fall approaches.

Calls are now being made for deliveries against ginning and cotton seed crushing time. The demand from this source will quicken the August market to some extent, but apparently there will not be as much coal used in those lines as heretofore on account of the shortage of the cotton crop in Alabama, Mississippi and Georgia.

Shipments are fair and evidently there is a considerable quantity of both steam and domestic coal going into storage during August. The railroads are rendering satisfactory service, but it is generally feared that it will be difficult during the fall and winter to get prompt shipments.

Alabama coal operators hope to obtain a larger share of trade at the ports this year than ever before and nothing is left undone to make headway in that direction. Terminal facilities are being improved and every cent that can be eliminated from the cost of production is being lopped off. The plans of the New Orleans and Alabama Transportation Co. to put on a barge line down the Warrior, Tombigbee, Alabama Rivers and by Mississippi Sound and Lake Borgne to New Orleans, have progreşed far enough to indicate a degree of certainity that it means a new factor in gulf coal business. This is spurring the railroads to renewed effort to afford every possible facility for quick service and terminal deliveries.

More coal will be consumed for coke during August than for many months. The iron furnaces are taking more and the commercial coke companies are keeping up full capacity.

Louisville, Ky.

The present year has been one of the best ever known in Louisville coal circles. Despite the fact that other districts throughout the country were unable to meet the demands made upon them during the winter, the local concerns were at all times well supplied and had little trouble in filling orders.

During the spring and summer the trade has continued brisk. At present a lively advertising campaign is on, led by two comparatively newcomers in the field, one the E. T. Slider Co., the other the Southern Coal & Coke Co. The latter company is featuring the Southern Star block coal and it is composed of well known men, identified with the local coal trade for years.

Detroit, Mich.

Bituminous—Market conditions at this point are very much the same as in midwinter. The large consumers cannot buy a pound of coal for spot shipment, and it appears as though the usual winter shortage in soft coal will be here before the summer expires. All the large dealers in domestic are stocked to their utmost capacity, but should a sudden cold snap come, the supply on hand would not last for more than 30 days at best, and many large consumers are anxious as to the outcome.

There is a slight advance all along the line, the market today being about as follows:

West Virginia	
Domestic lump	$1.80
¾-lump	1.20
Mine-run	1.05
Slack	0.75
Hocking	
Domestic lump	1.95
¾-lump	1.15
Mine-run	1.00
Slack	0.60
Cambridge	
¾-lump	1.15
Mine-run	1.00
Slack	0.80
Pocahontas	
Lump and egg	2.50
Mine-run	1.25
Slack	0 95

Anthracite—The scarcity of hard coal still continues and it is entirely out of the question for any one to get any of this product even in small quantities. It now appears that the predictions of the hard-coal famine will be realized.

It is now predicted the price will advance 75c. per ton by Sept. 1. Quotations today are:

Egg and stove	$7.50
Chestnut	7.75
Pea	6.75
Buckwheat	4.50

Coke—Many hundred tons of coke are being used in place of anthracite for domestic purposes, and the local manufacturers of this product find it necessary to stop taking orders for the present. The price has advanced about 10c. per ton on Semet Solvay and Connellsville.

Chicago

There is a stronger tone generally throughout the Chicago market, an increase being noted in orders for practically every grade. There has been an advance of 10c. in the price of both Franklin County and splint coal, and it is expected the same will occur on Hocking coal prices Sept. 1.

An increased production of screenings has resulted in fine coal being off 5c., but there is an unusual demand for smokeless. Orders are now being placed which ordinarily would not be received until some time next month.

There is unusual activity in the coke market. The Gary steel mills are running full time with double shifts a part of the time. Throughout the Chicago district blast furnaces and foundries are busy and using a large amount of coke.

Prevailing prices at Chicago are:

Sullivan County	
4-in. lump	$2.47
Egg	2.37
Mine run	1.99½
Screenings	1.72
Springfield	
Domestic lump	$2.17@2.32
Steam lump	1.87@1.97
Mine-run	1.82
Screenings	1.42@1.52
Clinton	
Domestic lump	$2.27
Steam lump	2.12
Mine-run	1.92
Screenings	1.67
Pocahontas and New River	
Mine-run	$3.30
Lump and egg	4.05

Coke—Prices asked for coke are: Connellsville, $5@5.10; Wise County, $4.85@5; byproduct, egg and stove, $4.75; byproduct, nut, $4.60; gas house, $4.50.

Minneapolis—St. Paul

General business conditions have improved within the last two weeks and it is believed that the dealers and steam users are getting ready to stock up. The publicity given the possibility of a car shortage seems to have had its effect and the week of cool weather resulted in a large number of orders.

With the advent of a more pronounced buying movement on the part of the retailers, prices on bituminous are being much better maintained, although it is thought concessions are being given the larger buyers. With the existing conditions and the growing demand this would seem unwarrantable, but nevertheless it is true.

The all-rail trade has been slow and quiet during the summer and it has picked up to a certain extent, but all-rail men believe it will be a whole lot livelier before the end of the month.

At the docks things are progressing in full sway, although supplies are away below normal. Dock men are shipping considerable hard coal out into the country and report that they are alread having trouble in receiving box-cars from the railroads.

St. Louis, Mo.

There has been a gradual stiffening on some sizes and grades in the St. Louis market the past week. In a general way there has been a better demand from both the city and country trade, especially for domestic coal. At times during the week Carterville nut coal went down to 95c. at the mines, but it was the only size of the high-grade coals that weakened.

The anthracite circular for August was withdrawn by nearly all the hard-coal companies on St. Louis shipments and anthracite from this time on will be figured at the September circular.

In a general way indications are good for a slight rise in the price of all domestic coals for the coming week.

The prevailing prices are:

Franklin County	
6-in. lump and egg	$1.40@1.60
No. 1 Nut	1.35@1.45
2-in. screenings	0.70@0.75
Carterville	
6-in. Lump and egg	$1.30@1.40
No. 1 nut	1.00@1.20
No. 2 nut	0.90@1.00
No. 3 nut	0.80@0.90
No. 1 washed	1.50@1.60
No. 2 washed	1.20@1.30
No. 3 washed	1.10@1.15
No. 4 washed	1.05@1.10
No. 5 washed	0.70@0.80
Standard	
6-in. lump	$1.00
2-in. lump	0.90
6-in. screenings	0.65
Mine-run	0.85
Anthracite	
Chestnut	$7.45
Egg and stove	7.20
Grate	6.95
Coke	
By-product F.O.B. St. Louis	$4.75
Gas house F.O.B. St. Louis	4.60

San Francisco, Calif.

The imports of foreign coal for the month of July have established a new low record, which will probably stand for many years to come. The total deliveries were only 4830 tons of Wellington from British Columbia. Needless to say, an appreciable inroad was made in the stocks of both the British Columbia and Australian product. The government received last month 22,623 tons of Pocahontas.

Prices to the trade are as follows, per short ton:

Wellington (British Columbia)	$8.00
Pelau Main (Australia)	8.00
Rocky Mountain	8.00
Cumberland	12.50

Portland, Ore.

The coal situation here is much as it has been since last winter, with no change in values. The present demand is light and consumers have not begun putting in supplies for the winter to any great extent.

South Prairie coal, mined about 20 miles from Tacoma, is being offered here to steamships for bunkers in competition with the Nanaimo, it being held that the steamship companies can save money by using this fuel as compared with the cost of sending the vessel around to the British Columbia port. The coal sells here for $5 per ton in large lots.

Production and Transportation Statistics

Anthracite Shipments

The following is a comparative statement of anthracite shipments for July, 1911-12, and the totals for the first 7 months of the current year, in long tons:

	1912	1911	7 Mos.
Phila. & Reading	1,217,892	825,309	6,479,227
Lehigh Valley	1,144,678	854,391	5,857,344
Cent. R. R. N. J.	865,618	545,158	4,237,708
Del. Lack. & West.	883,312	776,013	4,600,896
Del. & Hudson	687,843	483,217	3,261,055
Pennsylvania	545,655	408,291	2,900,546
Erie	708,568	720,221	3,876,108
Ont. & Western	231,587	191,465	1,169,248
Total	6,285,153	4,804,065	32,382,132
7 Months, 1911			40,113,648

The Car Situation

The beginning of the crop movement of 1912 was reflected in the statement of the American Railway Association for the fortnight ended with Aug. 1.

In the two weeks ended with this date the surplus of box cars decreased from 32,393 to 28,034, and the surplus of coal cars decreased from 15,420 to 11,964.

The following table shows the surplus and shortages of cars on 181 roads on Aug. 1:

	Surplus	Short	Net Surplus
Box	28,034	4,197	23,837
Flat	2,144	2,265	*121
Coal, gond. and hopper.	11,964	2,779	9,195
Other kinds	23,762	173	23,589
Total	65,904	9,394	56,510

Exports

Total exports of anthracite for June of the current year were 301,969 tons as compared with 340,664 tons for the same month last year.

Bituminous exports for June of the current year, exclusive of bunker coal, amounted to 1,360,489 tons, as compared with 1,311,097 tons for the same month last year; for the 12 months ended June 30, bituminous exports were 14,709,847 tons, as compared with 11,839,099 tons for the same period last year. Bunker or fuel coal laden on vessels in the foreign trade during June of the current year totaled 567,162 tons.

Hampton Tonnage

The following is a statement of the tonnages handled at the Chesapeake & Ohio and the Virginian Ry. piers at Hampton Roads during July:

	Sewells Point	C. & O. Piers
Berwind-White Coal Co.	.....	84,839
White Oak Coal Co.	.....	50,424
Chesapeake & Ohio Coal Agency Co.	.....	44,162
Smokeless Fuel Co.	7,595	34,070
New River Consolidated Coal Co.	.....	32,588
Chesapeake & Ohio Coal & Coke Co.	65,124	30,085
G. E. Warren Coal Co.	.....	15,485
Maryland Coal & Coke Co.	.....	6,441
Atlantic States Coal & Coke Co.	.....	2,297
New River Coal Co.	36,288	12,390
Castner, Curran & Bullitt	63,821	.....
Northern Coal Co.	21,601	.....
C. H. Sprague & Son	20,141	.....
Miscellaneous	.....	9,061
Total	214,570	311,751

Foreign Markets.

Belgium

The following is a comparative statement of fuel imports and exports in Belgium for the first half of the years 1911-12, in tons:

	Imports.		Exports.	
	1912	1911	1912	1911
Coal	3,884,851	3,696,581	2,452,953	2,585,883
Coke	454,372	333,466	463,406	501,187
Briquettes	201,295	185,236	338,828	251,983

France

The following is a comparative statement of fuel imports and exports in France for the first five months of the years 1911-12, in tons:

	Imports		Exports	
	1911	1912	1911	1912
Coal	6,943,800	5,708,100	538,137	957,708
Coke	1,027,000	1,086,500	65,618	67,612
Briquetts	499,100	447,900	49,175	87,660

Financial Notes

Island Creek Coal Co.—The recent dividend of this company will be financed through the issuance of 6000 additional shares of Common. Stockholders will be given warrants with which to subscribe for the new stock and any warrants not used for this purpose can, of course, be converted into cash. In that event stock not subscribed for will be taken by a syndicate of directors at $50 per share without commission of any kind.

Lackawanna Coal & Lumber Co.—This company located at Scranton, Penn., is being financed locally, one and three-quarter millions of its bonds having been placed by the company itself in the past 11 months. The company has an authorized capital stock of $12,000,000 (par $21) and is now offering at par, with a 50 per cent. stock bonus, $1,225,000 of its consolidated mortgage 6 per cent. sinking fund gold bond, dated Apr. 1, 1911.

Colorado Fuel & Iron Co.—The declaration of the two dividends on the preferred stock of this company came as a surprise only in the amount of the disbursement. Now that 5% is going to be paid on the preferred stock, it is recalled that prominent steel men have often said that the corporation was in position to manufacture iron and steel products cheaper than any other company in the country, barring only one or two of those in the United States Steel Corporation. There has been some talk recently about the Hill interest acquiring control of the company.

Crow's Nest Pass Coal Co.—Because of the strike at this company's mine during the year 1911, it suffered a net loss from all sources of operation during the year amounting to $200,654. The mines produced only 359,456 tons as compared with 1,209,762 tons the year previous. Development work was carried on during the strike, the amount charged to this account for the year being $11,573, while $23,122 was expended on improvements. Crow's Nest Pass Electric Light & Power Co. paid to the parent company a dividend of $5990. Net loss from operations of the Morrissey Fernie & Michel Railway Co. for the year amounted to $18,299. This latter company's outstanding bonds have been reduced from $37,500 to $27,500.

Throwing The Searchlight On Advertising

Little Talks on a Big Subject for Coal Age Readers

By the Ad. Editor

While the recent advertising convention was in session at Dallas, nearly all the churches gave up their pulpits one Sunday to different advertising men from all over the country.

Many modern business-sermons were preached to the congregations and many valuable ideas were brought forth.

Here's just one little quotation from one of the sermons—it shows what the advertiser has at stake and illustrates how much *your* confidence in him and his goods means:—

> "The results of all advertising are built upon one thing, and only one, the belief of our brothers that we are telling the truth.
>
> We have our trade-marks. They are worth nothing in themselves—merely symbols. And yet trademarks have been listed as assets and sold for prices running into the millions.
>
> These millions of dollars represent millions of minds—minds which have been convinced of the quality of the article for which the trade-mark stands—millions of minds filled with the belief that what is said about this article is true.
>
> Destroy that belief, betray that confidence, and your mark becomes worthless—often even worse than worthless."

Think for a moment what some of the names of manufacturers in *your* line of work are worth—Jeffrey, Ingersoll-Rand, General Electric, Sullivan, Link-Belt, Goulds and a host of others—

Names that have been built up to mean quality, merit and confidence—built up by advertising high grade products that make good for the buyer.

Could these concerns tell anything but the truth in their advertisements? If they had they wouldn't stand where they do today.

And with advertising building up the truth, isn't it wise for you to read it?

Begin now—that's the answer.

It pays to advertise only because it pays to buy advertised goods